Transportation Electrification in Michigan

A ROADMAP OF STATE POLICY ACTIONS

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EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

MICHIGAN ECONOMIC DEVELOPMENT CORPORATION
MICHIGAN OFFICE OF FUTURE MOBILITY & ELECTRIFICATION

STOLTE FAMILY FOUNDATION

PROJECT TEAM

Clean Fuels Michigan is a nonpartisan nonprofit trade association dedicated to advancing the clean transportation industries in Michigan. We take a cross-sector, cross-functional approach including policy advocacy and fostering industry collaboration to move forward, together.

The ***Institute for Energy Innovation (IEI)*** is a Michigan-based nonprofit organization that works to promote greater public understanding of advanced energy and its economic potential for Michigan, and to inform the policy and public discussions on Michigan's energy challenges and opportunities.

The ***Michigan Clean Fuels Institute***, a nonprofit organization focused on research, education, and initiatives, serves as an unbiased host for convenings and thought leadership on clean mobility in Michigan.

The ***Michigan Energy Innovation Business Council (Michigan EIBC)*** is a trade organization of more than 170 companies working in the advanced energy industry in Michigan whose mission is to grow Michigan's advanced energy economy by fostering opportunities for innovation and business growth and developing policy solutions to create a business-friendly environment for the advanced energy industry in Michigan.

ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

In September 2020, Michigan Governor Gretchen Whitmer issued Executive Directive 2020-10, which set a state goal of economy-wide carbon neutrality by 2050 and an interim goal to achieve a 28% reduction below 2005 greenhouse gas emission levels by 2025.[1] In response, the Michigan Department of Environment, Great Lakes, and Energy (EGLE) crafted the MI Healthy Climate Plan, which was released in April 2022.[2] Subsequently, in November 2022, the Michigan Office of Future Mobility and Electrification (OFME) released the MI Future Mobility Plan, which consists of an ambitious set of goals aimed at modernizing the state's transportation sector by leveraging and reaffirming Michigan's historic position as a leader in the clean mobility industry and mobility innovation.[3] That plan established a statewide goal of deploying 100,000 EV chargers by 2030 (including at-home chargers, workplace chargers, and public chargers) to support an anticipated 2 million EVs.[4]

To achieve these ambitious goals, ensure equitable EV charging deployment and EV adoption opportunities, and enable Michigan's clean mobility future, supportive state policies are critical. However, Michigan does not yet have a holistic framework or roadmap to guide policymakers and stakeholders seeking to make progress toward the goals.

Recognizing the importance of cohesive action that leverages the wealth of experience and perspectives within Michigan's mobility, utility, and advanced energy industries, the Institute for Energy Innovation, Michigan Energy Innovation Business Council, Clean Fuels Michigan, and the Michigan Clean Fuels Institute partnered to create this Transportation Electrification Roadmap which plots a course to achieving Michigan's electric mobility goals by providing policy recommendations based on national and international industry experience and expertise.

This report provides background information and case studies around the broad enablement of transportation electrification (*Section 3*), charging infrastructure (*Section 4*), EV adoption and deployment (*Section 5*), and grid readiness and reliability (*Section 6*). The report then details priority policy recommendations (*Section 7*) for the Executive Office of the Governor (EOG) and state agencies ("Executive"), the Michigan Public Service Commission (MPSC, "Regulatory"), and the Michigan Legislature ("Legislative"). ***These recommendations were prioritized in order of appearance in the report by the report authors in partnership with members of the Michigan Energy Innovation Business Council and Clean Fuels Michigan.*** Additional (lower priority) policy recommendations are listed in *Section 7.4*.

[1] Governor Gretchen Whitmer. Executive Directive 2020-10. September 2020. Available at https://www.michigan.gov/whitmer/news/state-orders-and-directives/2020/09/23/executive-directive-2020-10.

[2] Michigan Department of Environment, Great Lakes, and Energy. "MI Healthy Climate Plan." April 2022. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Offices/OCE/MI-Healthy-Climate-Plan.pdf?rev=d13f4adc2b1d45909bd708cafccbfffa.

[3] Michigan Office of Future Mobility and Electrification. "MI Future Mobility Plan." November 2022. Available at https://www.michiganbusiness.org/4aecec/globalassets/documents/mobility/state-strategy-for-the-future-of-mobility-and-electrification-detailed-version.pdf.

[4] *Ibid.*

The following "key recommendations" represent the most impactful recommendations from each section (i.e., executive, legislative, and regulatory) in priority order:

KEY RECOMMENDATIONS

- *Require state agencies including the Department of Technology, Management, and Budget, Department of Environment, Great Lakes and Energy, Department of Licensing and Regulatory Affairs, Department of Labor and Economic Opportunity, Department of Transportation, the Michigan Public Service Commission, and others, to use the state's 100,000 charger/2 million EV deployment goal in their planning and evaluation criteria.*
- *Pass new legislation to establish and implement a Clean Fuel Standard.*
- *Pass new legislation to create the statutory authority for utilities to make comprehensive investments in transportation electrification at scale and require that utility transportation electrification plans are filed as contested cases with approved plans providing expected cost recovery over the proposed planning horizon.*
- *Encourage utilities to conduct EV load forecasting in a granular manner that allows for "no regrets" investments to mitigate grid constraints at anticipated congestion points.*
- *Support the expansion of utility rebates to enable investments in EV supply equipment and software including for multifamily housing and rental units, workplace charging, and direct current fast charging and Level 2 public charging, especially in disadvantaged communities, rural areas, and other under-invested areas.*
- *Adopt language in the state energy conservation code to require all new homes and buildings to be EV-Ready.*

The following recommendations (in order of priority within each section) represent priority policies that Michigan can pursue:

Executive

- Require state agencies including the Department of Technology, Management, and Budget (DTMB), EGLE, Department of Licensing and Regulatory Affairs (LARA), Department of Labor and Economic Opportunity (LEO), Department of Transportation (MDOT), MPSC, and others, to use the state's 100,000 charger/2 million EV deployment goal in their planning and evaluation criteria.
  [Complementary to legislative recommendation]
- Adopt language in the state energy conservation code to require all new homes and buildings to be EV-Ready (EV-R).
- Conduct a granular EV supply equipment (EVSE) needs assessment that considers EV adoption growth, different types of chargers in various settings and market segments, equitable charger deployment, the implementation of innovative solutions, and the projected utility load growth required.
- Transition all state fleet vehicles to 100% EVs. Plans should be updated regularly to account for vehicle availability, price fluctuations, etc., and should be made publicly available.
- Support incentives in the state budget for Level 2 and direct current fast chargers (DCFC), especially for EVSE in disadvantaged communities (DACs) and rural areas, multi-family housing, and fleet charging applications.
  [Complementary to legislative recommendation]
- Support incentives in the state budget to enable the adoption of new and used (owned and leased) light-, medium-, and heavy-duty EVs for public and private fleets, prioritizing those operating primarily in DACs.
  [Complementary to legislative recommendation]
- Support incentives in the state budget to enable the adoption of new and used (owned and leased) passenger EVs, targeting incentives toward moderate and low-income buyers.
  [Complementary to legislative recommendation]
- Streamline the permitting process by creating model EVSE permitting processes and educating local jurisdictions.
- Develop model zoning ordinances that specifically address EVSE for various use cases and use model ordinances to support education of local jurisdictions.
- Develop efficient, comprehensive, and centralized tools to help different user types and communities install EV chargers.
- Establish an EV Readiness Program for community and local government leadership to foster understanding and ease the transition to EVs, prioritizing DAC participation.
- Establish a robust talent pipeline for the clean mobility workforce to support operations and maintenance needs in the clean mobility sectors, including by supporting state funding for charger and EV maintenance programs at technical schools and community colleges, wrap-around services, soft skill training, and placement support.
- Establish low-cost financing opportunities for organizations, such as local units of government, political subdivisions, universities, and businesses looking to electrify fleets, paired with education to foster participation in DACs and rural areas.
- Align EVSE reliability standards among utility programs, state grant programs, and local funding programs to follow the National Electric Vehicle Infrastructure (NEVI) guidance related to uptime.
  [Complementary to regulatory and legislative recommendations]

Regulatory

- Encourage utilities to conduct EV load forecasting in a granular manner that allows for "no regrets" investments to mitigate grid constraints at anticipated congestion points.
- Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.

- Establish utility make-ready programs and policies to waive or enhance Contribution in Aid of Construction (CIAC) requirements.
- Establish consistent benefit-cost analysis methodologies to ensure accounting of Transportation Electrification Plan (TEP) benefits from EV charging and the appropriate use of revenue to support deployment of EVSE and EV load management.
- Establish policies necessary to enable and support deployment of vehicle-to-X (V2X) technologies at scale.
- Support alternative and complementary approaches to time-of-use rate design, such as active managed charging, to optimize grid load and maximize customer benefits while minimizing new capital expenditures.
- Support policies to waive demand charges for DCFC until utilization rates increase sufficiently.
- Require Michigan's utilities to provide up-to-date publicly available bidirectional hosting capacity maps to provide sufficient detail to allow right-sizing of installed EV chargers and installation of EV chargers in locations with sufficient distribution infrastructure.
- Establish an interconnection technical workgroup to collaboratively plan for future EV interconnection issues including those related to V2X.
- Align EVSE reliability standards among utility programs, state grant programs, and local funding programs to follow the NEVI guidance related to uptime.
  [Complementary to executive and legislative recommendations]

Legislative

- Pass new legislation to establish and implement a Clean Fuel Standard (CFS).
- Pass new legislation to create the statutory authority for utilities to make comprehensive investments in transportation electrification at scale and require that utility TEPs are filed as contested cases with approved plans providing expected cost recovery over the proposed planning horizon.
- Adopt incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing (MFH), and fleet charging applications.
  [Complementary to executive recommendation]
- Pass new legislation updating Michigan's construction code statute to require the Bureau of Construction Codes (BCC) to update its energy conservation code every 3 years and remove the 7-year cost-effective requirement for new codes.
- Pass new legislation to require state agencies, including DTMB, EGLE, LARA, LEO, MDOT, the MPSC, and others, to use the state's 100,000 charger/2 million EV deployment goal in their planning and evaluation criteria.
  [Complementary to executive recommendation]
- Adopt incentives in the state budget to enable the adoption of new and used (owned and leased) light-, medium-, and heavy-duty EVs for public and private fleets, prioritizing those operating primarily in DACs.
  [Complementary to executive recommendation]
- Adopt incentives in the state budget to enable the adoption of new and used (owned and leased) passenger EVs, targeting incentives toward moderate and low-income buyers.
  [Complementary to executive recommendation]
- Pass new legislation ensuring homeowners and renters living in condominiums and multi-family housing cannot be unreasonably prevented from installing EV chargers.
- Pass new legislation establishing tax credits for local businesses, to transition from internal combustion engine (ICE) vehicles to EVs, paired with technical support for entities located in DACs and rural areas.
- Pass new legislation to align EVSE reliability standards among utility programs, state grant programs, and local funding programs to follow the NEVI guidance related to uptime.
  [Complementary to executive and regulatory recommendations]

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

Electric Vehicle Terms

AC: alternating current
BEV: battery electric vehicle
CCS: combined charging system
DC: direct current
DCFC: direct current fast charging
EV: electric vehicle
EV-C: electric vehicle-capable
EV-I: electric vehicle-installed
EV-R: electric vehicle-ready
EVSE: electric vehicle supply equipment
EVSP: electric vehicle service provider
ICE: internal combustion engine
kW: kilowatt
MHD: medium- and heavy-duty
PHEV: plug-in hybrid electric vehicle
TW: terawatt
ZEV: zero emission vehicle

Federal and Michigan State Agency Acronyms

BCC: Michigan Bureau of Construction Codes
DOE: U.S. Department of Energy
DNR: Michigan Department of Natural Resources
DTMB: Michigan Department of Technology, Management, and Budget
EGLE: Michigan Department of Environment, Great Lakes, and Energy
EOG: Michigan Executive Office of the Governor
EPA: U.S. Environmental Protection Agency
FERC: Federal Energy Regulatory Commission
FHWA: Federal Highway Administration
LARA: Michigan Department of Licensing and Regulatory Affairs
LEO: Michigan Department of Labor and Economic Opportunity
MDOT: Michigan Department of Transportation
MEDC: Michigan Economic Development Corporation
MIO: Michigan Infrastructure Office
MISO: Midcontinent Independent System Operator
MPSC: Michigan Public Service Commission
MSHDA: Michigan State Housing Development Authority
NREL: National Renewable Energy Laboratory
OFME: Michigan Office of Future Mobility and Electrification
USDA: U.S. Department of Agriculture

Regional and Local Governmental Organizations

DDOT: Detroit Department of Transportation
CATA: Capitol Area Transportation Authority
MML: Michigan Municipal League
SEMCOG: Southeast Michigan Council of Governments

Other Terms

ADA: Americans with Disabilities Act
AFC: Alternative Fuel Corridor
AHJ: authorities having jurisdiction
AI: artificial intelligence
BCA: benefit-cost analysis
BWL: Lansing Board of Water and Light
CFS: clean fuel standard
CI: carbon intensity
CIAC: contribution in aid of construction
CO2: carbon dioxide
DAC: disadvantaged community
DER: distributed energy resource
ECO: Energy Credits Online
EIBC: Energy Innovation Business Council
EPRI: Electric Power Research Institute
ESB: electric school bus
ESG: environmental, social, and governance
EVAL: Electric Vehicle Adoption Leadership
FFR: fast frequency response
FY: fiscal year
GPI: Great Plains Institute
HOA: homeowners association
I&M: Indiana Michigan Power Company
ICCT: International Council on Clean Transportation
IECC: International Energy Conservation Code
IEI: Institute for Energy Innovation
IIJA: Infrastructure Investment and Jobs Act
IOU: investor-owned utility
IRA: Inflation Reduction Act
IREC: Interstate Renewable Energy Council
LCFS: low carbon fuel standard
LEED: Leadership in Energy and Environmental Design
LI: low-income
LRTP: Long-Range Transmission Plan
MFH: multifamily housing
MITA: Michigan Infrastructure and Transportation Association
MMC: [Illinois] Metropolitan Mayors Caucus
MOU: memorandum of understanding
MSRP: manufacturer's suggested retail price
NPV: net present value
O&M: operations and maintenance
PIM: performance incentive mechanism
PSE+G: New Jersey Public Service Electric and Gas Company
PUC: public utility commission
REV: Regional Electric Vehicle
SCC: social cost of carbon
SFH: single-family home
SOAR: Strategic Outreach Attraction Reserve
NEVI: National Electric Vehicle Infrastructure
OEM: original equipment manufacturer
TEP: transportation electrification plan
TNC: transportation network company
TOU: time-of-use
UPPCO: Upper Peninsula Power Company
V2B: vehicle-to-building
V2G: vehicle-to-grid
V2H: vehicle-to-home
V2V: vehicle-to-vehicle
V2X: vehicle-to-everything
VPP: virtual power plant

SECTION 1: THE GOAL AND THE IMPACT IN MICHIGAN

The automated, connected, and shared future of our transportation sector – in Michigan and across the globe – will rely heavily on an electrified platform. Passenger EV sales were expected to total 1.4 million in the U.S. in 2023 and are predicted to increase to 1.9 million vehicles in 2024.[5] Michigan, accounting for 20% of total automotive production in the U.S., has long been recognized as the epicenter for automotive innovation.[6] This legacy has continued as the state has been successful in growing its capacity to manufacture EVs in recent years, positioning itself at the forefront of the transition to electric mobility. Michigan's automakers are also making major commitments and financial investments toward an electrified future. In fact, Michigan has been the first choice in EV and battery investments since 2018, receiving $34 billion, or 21% of all planned investments in the U.S.[7] General Motors has committed to selling only zero-emission vehicles by 2035,[8] Ford Motor Company's EV sales increased by 86% in 2023,[9] and Stellantis has committed to achieve 100% of passenger car battery electric vehicles (BEVs) sales in Europe and 50% of passenger car and light-duty truck BEV sales in the U.S. by the end of 2030.[10] According to a 2022 report, in Michigan, there are more than 32,000 jobs in the clean transportation sector, with more than 9,000 jobs working on BEVs, nearly 7,000 in plug-in hybrid electric vehicles (PHEVs), and more than 14,600 in hybrid EVs.[11] In 2022, growth in clean transportation jobs was the state's fastest-growing clean energy industry sector at 14.4%.[12]

In parallel with these economic drivers, Michigan policymakers have established aggressive goals to decarbonize the state's economy and electrify transportation. In September 2020, Governor Gretchen Whitmer issued Executive Directive 2020-10, which set a state goal of economy-wide carbon neutrality by 2050 and an interim goal to achieve a 28% reduction below 2005 greenhouse gas emission levels by 2025.[13] To achieve these goals, the Executive Directive charged EGLE with developing the MI Healthy Climate Plan, which EGLE released in April 2022.[14] Building upon these goals, in November 2022, the OFME released the MI Future Mobility Plan.[15] That plan established a goal of deploying 100,000 EV chargers by 2030 across the state (including at-home chargers, workplace chargers, and public chargers) to support an anticipated 2 million EVs.[16]

Despite the growth in EV adoption and EV charger deployment across Michigan, the state still has significant progress to make in order to ensure adequate EV charging infrastructure buildout and support for individuals and businesses who wish to electrify their vehicles. In 2022, there were 9.4 million vehicles registered in the state of Michigan[17] but only 33,100

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[5] O'Donovan, A. "Electrified Transport Market Outlook 4Q 2023: Growth Ahead." *Bloomberg New Energy Finance.* January 2024. Available at https://about.bnef.com/blog/electrified-transport-market-outlook-4q-2023-growth-ahead/#:~:text=BNEF%20now%20expects%20North%20America,US%20and%20230%2C000%20in%20Canada.

[6] Kuykendall, K. "EV Manufacturing Race: Which US States are Taking an Early Lead?" *S&P Global.* May 2023. Available at https://www.spglobal.com/marketintelligence/en/mi/research-analysis/ev-manufacturing-race-which-us-states-are-taking-early-lead.html.

[7] MICHauto. "Michigan EV Landscape." Accessed July 2024. Available at https://michauto.org/michigan-ev-landscape/#Vehicles.

[8] Costello, T. and R. Wile. "GM CEO Says Commitment to All-electric Fleet Remains Firm Despite Industry-wide Sales Slowdown." *NBC News.* June 2024. Available at https://www.nbcnews.com/business/autos/gm-mary-barra-all-electric-ev-commitment-rcna155389#.

[9] Ford Motor Company. "Ford Updates EV, Hybrid Plans, Readies Manufacturing Plants." April 2024. Available at https://media.ford.com/content/fordmedia/fna/us/en/news/2024/04/04/ford-updates-timing-for-next-gen-evs--readies-manufacturing-plan.html.

[10] Stellantis. "Aggressive Electrification Roadmap." Accessed June 2024. Available at https://www.stellantis.com/en/responsibility/carbon-net-zero-strategy/vehicles.

[11] Clean Jobs Midwest. "Clean Energy Jobs in Michigan." 2022. Available at https://www.cleanjobsmidwest.com/state/michigan.

[12] *Ibid.*

[13] Governor Gretchen Whitmer. Executive Directive 2020-10. September 2020. Available at https://www.michigan.gov/whitmer/news/state-orders-and-directives/2020/09/23/executive-directive-2020-10.

[14] Michigan Department of Environment, Great Lakes, and Energy. "MI Healthy Climate Plan." April 2022. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Offices/OCE/MI-Healthy-Climate-Plan.pdf?rev=d13f4adc2b1d45909bd708cafccbfffa.

[15] Michigan Office of Future Mobility and Electrification. "MI Future Mobility Plan." November 2022. Available at https://www.michiganbusiness.org/4aecec/globalassets/documents/mobility/state-strategy-for-the-future-of-mobility-and-electrification-detailed-version.pdf.

[16] *Ibid.*

[17] U.S. Department of Transportation. Bureau of Transportation Statistics. Accessed June 2024. Available at https://www.bts.gov/browse-statistical-products-and-data/state-transportation-statistics/state-highway-travel.

were EVs,[18] positioning Michigan as the 18th state in terms of total number of EV registrations, and 29th in terms of per-capita adoption.[19] There are now more than 61,000 public EV charging stations across the country, and according to a recent Pew Research Center Study, 64% of Americans now live within two miles of a public charger.[20] In Michigan, there are approximately 1,400 public EV charging stations with a total of 3,360 charging ports.[21] This deployment is similar to other Midwest states, but does not position the state as a leader in the field. As of February 2024, Ohio had 1,555 public EV charging stations; Illinois had 1,248, and Pennsylvania had 1,667, whereas Illinois and Wisconsin each had less than 600.[22] In addition, there are more than 12,265 home chargers across the state that have been supported by rebates from DTE Energy and Consumers Energy Company.[23, 24] Given the increase in EV adoption, this likely represents only a portion of the home chargers actually operating across the state, and continued development of the charging infrastructure network is imperative to encourage continued EV adoption.[25, 26, 27, 28]

However, it is important to recognize that deployment of EVs and EV charging stations has not been consistent across the state or benefitted all communities. Michigan is a stark example of the economic and environmental injustices that linger from the past. There are 350 census tracts that are defined as "Justice40 eligible"[29] across the state. It is imperative that these DACs are afforded the same access to electrified transportation and ability to benefit from the economic and health benefits of transportation electrification as the rest of the state. Electrification can eliminate health risks caused by high-polluting vehicles, lower costs for those who switch from aging and inefficient internal combustion engine (ICE) vehicles and provide backup power to those communities most impacted by outages and extreme weather events. Therefore, any state actions to enhance transportation electrification should be considerate of all of Michigan's people, benefitting every Michigander from downtown Detroit to the western Upper Peninsula.

This report describes the state of EV charging infrastructure, EV deployment, and electric grid readiness in Michigan as well as in other areas of the U.S. and provides detailed policy recommendations to address the existing challenges and capture opportunities.

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[18] U.S. Department of Energy. Alternative Fuels Data Center. "Vehicle Registration Counts by State." Accessed June 2024. Available at https://afdc.energy.gov/vehicle-registration.

[19] U.S. Department of Energy. Alternative Fuels Data Center. "TransAtlas." Accessed June 2024. Available at https://afdc.energy.gov/transatlas#/?year=2022&view=per_capita&state=MI.

[20] Bestvater, S. and S. Shah. "Electric Vehicle Charging Infrastructure in the U.S." Pew Research Center. May 2024. Available at https://www.pewresearch.org/data-labs/2024/05/23/electric-vehicle-charging-infrastructure-in-the-u-s/.

[21] U.S. Department of Energy. Alternative Fuels Data Center. Accessed June 2024. Available at https://afdc.energy.gov/stations#/analyze?region=US-MI&fuel=ELEC.

[22] Bestvater, S. and S. Shah. Pew Research Center. "Electric Vehicle Charging Infrastructure in the U.S." May 2024. Available at https://www.pewresearch.org/data-labs/2024/05/23/electric-vehicle-charging-infrastructure-in-the-u-s/.

[23] Consumers Energy. Case No. U-21538. "2023 Consumers Energy Transportation Electrification Plan 2024." June 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/document/download/0698y00000E0M6OAAV?operationContext=S1.

[24] DTE Energy. Case No. U-20162. "Charging Forward: DTE Electric EV Programs Quarterly Update." July 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/document/download/069cs000002OjfkAAC?operationContext=S1.

[25] Osaka, S. "For each public charger, here's how many EVs are looking to plug in." *The Washington Post.* May 2024. Available at https://www.washingtonpost.com/climate-solutions/2024/05/20/charging-stations-lag-ev-sales/.

[26] Center for Sustainable Energy. "The State of Electric Vehicle Adoption in the U.S. and the Role of Incentives in Market Transformation." September 2023. Available at https://energycenter.org/thought-leadership/blog/state-electric-vehicle-adoption-us-and-role-incentives-market#:~:text=Publicly%20available%20EV%20charging%20inspires,apartments%2C%20to%20charge%20an%20EV.

[27] U.S. Department of Energy. Alternative Fuels Data Center. "Charging Electric Vehicles in Public." Accessed June 2024. Available at https://afdc.energy.gov/fuels/electricity-charging-public.

[28] International Energy Agency. "Global EV Outlook 2024: Moving towards increased affordability." 2024. Available at https://iea.blob.core.windows.net/assets/a9e3544b-0b12-4e15-b407-65f5c8ce1b5f/GlobalEVOutlook2024.pdf.

[29] Michigan Municipal League. "Justice40 Fact Sheet." Accessed July 2024. Available at https://mmlfoundation.org/wp-content/uploads/2023/10/Justice40-Fact-Sheet.pdf.

SECTION 2: OVERVIEW OF EV CHARGER TYPES

EVSE is classified according to the rate at which a vehicle's battery is charged (i.e., the maximum amount of power that the charger provides to the vehicle, measured in kilowatts (kW)). The table below provides a basic overview of these charger types, the type of power used by each, and a brief description of their common use cases:

Table 1: *Types of chargers and use cases*[30, 31, 32]

	EVSE Type		
	Level 1	**Level 2**	**DCFC**
Range of kW	1 – 2 kW	7 – 19 kW	50 – 400 kW +
Type of Power	Alternating current (AC)	AC	Direct current (DC)
Miles of Range per 1 hr of Charge	Approx. 5 miles	Approx. 25 miles	Approx. 180 - 240 miles
Description	Level 1, "trickle" charging provides power through a standard 120V plug. Level 1 charging is most used in at-home and other long-duration charging applications. Due to the low power draw, the use of a Level 1 charging typically does not have an impact on grid capacity.	Level 2 chargers provide charging through a 240V or 208V plug, for residential and commercial applications. These chargers are often used in homes and other settings, where the driver is away from the vehicle for a moderate amount of time.	DCFCs use high-powered equipment that often requires 480V three phase AC power. The range of miles gained depends on a variety of factors. DCFCs enable rapid charging and are the preferred method of charging for long-distance traveling, some fleets, and transportation network company (TNC) drivers.

The different types of chargers lend themselves to different use cases. When choosing equipment for a specific application, it is important to consider several factors including charging time, electricity usage, networking, payment capabilities, and operations and maintenance.[33]

[30] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[31] U.S. Department of Energy. Alternative Fuels Data Center. "Electric Vehicle Charging Stations." Accessed June 2024. Available at https://afdc.energy.gov/fuels/electricity-stations.

[32] U.S. Department of Transportation. "Charger Types and Speeds." Accessed June 2024. Available at https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds#:~:text=Direct%20Current%20Fast%20Charging%20(DCFC)&text=DCFC%20equipment%20can%20charge%20a,not%20work%20with%20fast%20chargers.

[33] U.S. Department of Energy. Alternative Fuels Data Center. "Electric Vehicle Charging Stations." Accessed June 2024. Available at https://afdc.energy.gov/fuels/electricity-stations.

SECTION 3: CURRENT STATE OF TRANSPORTATION ELECTRIFICATION: CRITICAL ENABLEMENT

There are several policies that are important for the broad enablement of transportation electrification that do not fit neatly into the categories of Charging Infrastructure, EV Adoption and Deployment, and Grid Readiness and Reliability. These include supportive building codes, communication and community engagement, workforce expansion, and adoption of a clean fuel standard.

Section 3.1: Building Codes

Expanding access to EV charging is critical for adoption of EVs. A key policy lever to support more cost-effective deployment of EV charging is ensuring homes and businesses are built with the electrical infrastructure necessary to install EV chargers. Building codes, and more specifically, energy codes, are an important tool for allowing states and municipalities to require new homes and buildings to have the infrastructure needed at the time of construction to later support installation of EV chargers.

Broadly, building codes are government regulations that set minimum requirements for how various aspects of residential and commercial buildings, such as heating and cooling or structural systems, should be designed and constructed.[34] Typically, these codes are determined by state and local governments by utilizing model codes that can be adjusted according to state or local needs.[35] Energy codes are one subset of broader building codes that set minimum energy building design and energy efficiency requirements for new residential and commercial construction.[36] State and local governments typically utilize the International Energy Conservation Code (IECC) and ANSI/ASHRAE/IES Standard 90.1-2019, which are updated every three years, as model codes for their state and local energy codes.[37]

RECOMMENDATION

Adopt language in the state energy conservation code to require all new homes and buildings to be EV-R.

In both model code development and state/local code adoption, there has been a growing movement to include infrastructure and electrical requirements to support installation of EV chargers in the minimum requirements for new construction. EV infrastructure building codes typically fall into two categories: EV-Capable (EV-C) parking spaces and EV-R parking spaces (for details, see *Section 4.1*). EV-C parking spaces include the electrical panel capacity and conduit needs to accommodate future EV chargers.[38] EV-R parking spaces include the infrastructure for EV-C spaces as well as the wiring and other needs for the circuit, without the actual charger installed.[39] Homes and buildings that are built with EV-C and/or EV-R parking spaces will

[34] U.S. Department of Commerce. National Institute of Standards and Technology. "Understanding Building Codes." June 2022. Available at https://www.nist.gov/buildings-construction/understanding-building-codes#:~:text=Building%20codes%20are%20laws%20that,should%20be%20designed%20and%20constructed.

[35] *Ibid.*

[36] U.S. Department of Energy. Building Energy Codes Program. "Codes 101." Accessed June 2024. Available at https://www.energycodes.gov/codes-101.

[37] *Ibid.*

[38] U.S. Department of Energy. Alternative Fuels Data Center. "Building Codes, Parking Ordinances, and Zoning Ordinances for Electric Vehicle Charging Infrastructure." Accessed June 2024. Available at https://afdc.energy.gov/fuels/electricity-codes-and-ordinances.

[39] *Ibid.*

reduce the overall cost for installing a charger. By requiring EV infrastructure at the time of construction, the cost of installing an EV charger at a later date is decreased by about 75%, compared to installing an EV charger through a building retrofit.[40]

In Michigan, the building code adoption process is authorized under the Stille-DeRossett-Hale Single State Construction Code Act (1972 PA 230; Construction Code Act).[41] As the name suggests, Michigan has a single state code, which means that the state adopts a uniform code that sets the minimum requirements for the entire state. As such, local governments cannot adopt building codes that are more stringent than the uniform state code. In Michigan, codes are updated by administrative rule through the BCC. Under the Construction Code Act, LARA has the option to update the energy code every three years to match the model code schedule, or to skip a code cycle and update the energy code every six years. When the state adopts new codes, it adopts two codes: a residential code, which covers residential buildings and multi-family dwellings three stories or less in height, and a commercial code, which covers commercial buildings and multi-family dwellings that are four or more stories in height. Currently, Michigan is in the final stages of updating its energy codes to the 2021 IECC, which does not include language to support EV infrastructure requirements in new construction. Unfortunately, in March 2024, although EV readiness provisions were considered as part of the 2024 IECC, those provisions were ultimately rejected in the final stage of the ruling process.[42]

RECOMMENDATION

Pass new legislation updating Michigan's construction code statute to require the BCC to update its energy conservation code every 3 years and remove the 7-year cost-effective requirement for new codes.

In the future, LARA could adopt specific energy code language as an amendment to one of these model IECC codes (see *Appendix I* and *Appendix II*). In addition, there are critical updates that need to be made to the Construction Code Act to enable EV-readiness. Specifically, the Act requires LARA to consider benefits and costs over a seven-year period when considering changes to the energy efficiency standards in a new code. This requirement may restrict LARA in the types of updates it can make to a code and does not consider readiness provisions. Removing this language would give LARA more flexibility under the law to make code updates that include EV infrastructure. Additionally, the Act could be updated to require more frequent code updates, code updates by a certain year, or consideration of state decarbonization goals.

Other states and jurisdictions have adopted EV infrastructure building codes through their own processes. For example, in its 2022 building code update, California established requirements that new residential and commercial properties must install EV chargers at the time of construction.[43] In 2023, Colorado released a new building code that requires EV readiness for single-family residential homes and EVSE-installed spaces in 20% or more of parking spaces for commercial and multifamily buildings.[44]

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[40] Southwest Energy Efficiency Project. "SWEEP Guide to EV Infrastructure Building Codes." Accessed June 2024. Available at https://www.swenergy.org/ev-infrastructure-building-codes/.

[41] Michigan Legislature. Michigan Public Act 230 of 1972. "Stille-Derossett-Hale Single State Construction Code Act." January 1973. Available at https://www.legislature.mi.gov/Laws/MCL?objectName=MCL-ACT-230-OF-1972.

[42] DiChristopher, T. "Electrification, EV Advocates Suffer Defeat in 2024 Building Code Update." *S&P Global.* March 2024. Available at https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/electrification-ev-advocates-suffer-defeat-in-2024-building-code-update-80988504.

[43] Oreizi, D. "EV Charging Required at New Developments per 2022 California Building Code." *Charged Future.* August 2022. Available at https://www.chargedfuture.com/ev-charging-required-at-new-developments-per-2022-california-building-code/.

[44] Burns, J. "Colorado releases new statewide building energy codes." *Industry Dive.* June 2023. Available at https://www.facilitiesdive.com/news/colorado-energy-building-codes-EV-solar-panels/652342/.

Section 3.2: Communication and Community Engagement

A lack of clear information, confusion about opportunities, and misinformation can be common points of frustration for those navigating the purchase of an EV or installation of EVSE. Increasing awareness of funding opportunities, providing education and engagement to local units of government, and improving communication with current and potential EV adopters can vastly improve the experience that these parties have in their transportation electrification journeys. Conversely, failure to communicate these opportunities and develop effective engagement programs can lead to project abandonment and reduce economic engagement in a community.

RECOMMENDATION

Require state agencies including the DTMB, EGLE, LARA, LEO, MDOT, MPSC, and others, to use the state's 100,000 charger/2 million EV deployment goal in their planning and evaluation criteria.

State agencies such as EGLE, MEDC, and LEO can provide leadership to guide a cohesive communications strategy alongside groups like MML, Council of Governments, and others.

Navigating Funding Opportunities

As described previously, local governments play a critical role in ensuring that their communities are prepared to meet the growing demand for EVs and EV charging infrastructure. Today, countless independent, state, and federal tools exist that various applicants can use to search for relevant grant opportunities including those relevant to Michigan listed in Table 2.

Table 2: Tools to assist applicants in finding sources of funding

Title	Administrator	Details
MI Funding Hub	LEO and MML	This is a one-stop resource to help local governments navigate federal and state grants and access online application resources.[45]
Michigan Infrastructure Technical Assistance Center	Michigan Infrastructure Office (MIO)	The MIO Technical Assistance Center (TAC) assists users in navigating grant opportunities and staying up to date on the implementation of federal funds.[46, 47] In May 2024, the TAC closed its third application period to provide grant writing and cost matching support. Additional application periods are expected to open in the future. In late 2023, the U.S. Environmental Protection Agency (EPA) opened the Environmental and Climate Justice Community Change Grants program, allocating $2 billion to benefit DACs for climate-focused projects. Applications are being accepted by the EPA on a rolling basis, and MIO and Michigan's Office of Climate and Energy can aid applicants.[48]
EV Funding Finder	The Electrification Coalition	This tool is organized by applicant type to identify federal funding opportunities.[49]
Michigan Laws and Incentives	Alternative Fuels Data Center	The U.S. Department of Energy (DOE) provides a summary of state, utility, and private incentives for all applicant types.[50]

Despite these resources, it can be difficult for local governments that are already capacity constrained to implement effective EV policies or devote resources to apply for grant programs to enable local transportation electrification.

Community Engagement

To address these issues, the Illinois Metropolitan Mayors Caucus (MMC) and the Illinois Commonwealth Edison Company (ComEd) developed the EV Readiness Program to help local governments prepare to meet growing demand for EVs and EV charging infrastructure and apply for state and federal funding opportunities.[51]

With guidance, tools, and resources assembled by the MMC's EV Readiness Team, municipal leaders develop clear permitting for EV charging infrastructure, analyze zoning and parking codes to address barriers to EV infrastructure, engage their community, and participate in technical and safety training for staff. The MMC's EV Readiness Advisory Committee, which is composed of a wide variety of stakeholders, also developed the publicly available EV Readiness Checklist (further details provided in *Appendix III*).[52] The Checklist clearly outlines the actions that communities are required to take to achieve a Bronze, Silver, or Gold EV Readiness designation by earning points in the following program categories:

- Commit to EV Readiness
- Zoning and Planning
- Permitting and Inspection
- Safety and Training
- Parking and Access
- New Construction
- Access to EV Charging
- Municipal Fleets
- Utility Engagement
- Community Engagement
- Market Development and Finance

[45] Michigan Municipal League. "MI Funding Hub." 2024. Available at https://mifundinghub.org/.

[46] State of Michigan, Office of the Governor. "MIO Technical Assistance Center." Accessed June 2024. Available at https://www.michigan.gov/whitmer/issues/michigan-infrastructure-office/michigan-infrastructure-technical-assistance-center.

[47] State of Michigan Office of the Governor. "Michigan Infrastructure Office." Accessed June 2024. Available at https://www.michigan.gov/whitmer/issues/michigan-infrastructure-office.

[48] State of Michigan. "Make It in Michigan Competitiveness Fund Climate Justice Challenge." Accessed June 2024. Available at https://www.michigan.gov/whitmer/-/media/Project/Websites/Whitmer/Documents/MIO-MIIMCF/EPA-Community-Change-Grants.pdf?rev=f7bb778cfe134716923e3561ba1908b9.

[49] Electrification Coalition. "EV Funding Finder: A User-friendly Tool to Identify Federal Funding Opportunities." Accessed June 2024. Available at https://electrificationcoalition.org/ev-funding-finder/.

[50] U.S. Department of Energy. Alternative Fuels Data Center. "Michigan Laws and Incentives." Accessed June 2024. Available at https://afdc.energy.gov/laws/all?state=MI.

[51] Metropolitan Mayors Caucus. "EV Readiness Program." 2022. Available at https://mayorscaucus.org/initiatives/environment/becoming-ev-ready/.

[52] Metropolitan Mayors Caucus. "EV Readiness Checklist." 2023. Available at https://mayorscaucus.org/wp-content/uploads/2023/08/EV-Readiness-Checklist-3.0-for-web.xlsx.

Invited to apply in the fall of 2022, the first cohort of 12 participating communities started the EV Readiness Program in December 2022 and received their designations one year later. In 2023, with the assistance of the EV Readiness Program, several participating communities submitted a regional application for a $15 million grant from the Federal Charging and Fueling Infrastructure Grant program to fund the construction of a network of 114 public chargers across the greater Chicago region.[53]

Modeled on the Department of Energy's SolSmart community readiness program, which focuses on solar energy development, the Great Plains Institute (GPI) and IREC worked with over 50 communities across the Midwest, including in Michigan through cooperation with the MML and the Ecology Center, to develop the Charging Smart (formerly EV Smart) program, which is accepting participants now.[54, 55, 56] Twenty-four communities in Michigan and Ohio went through the six-month Charging Smart program that concluded in March 2023.[57] Throughout its development phase, participating communities, worked to set goals and test standards related to transportation electrification.[58] Like the MMC EV Readiness Program, Charging Smart will be cohort based and will award participating communities with a Bronze, Silver, or Gold certification according to the achievement of defined metrics.[59]

RECOMMENDATION

Establish an EV Readiness Program for community and local government leadership to foster understanding and ease the transition to EVs, prioritizing DAC participation.

Through efforts like the Illinois EV Readiness Program and the Charging Smart program, localities can become better partners for community members seeking to enable transportation electrification. Organizations like MML and the Ecology Center, which played critical roles in the development of the Charging Smart program and have deeply ingrained relationships in the community, could lead the expansion of the Charging Smart program to serve more Michigan communities. This program could also leverage the existing MI Funding Hub tool to provide education and technical support for localities seeking state and federal funding.[60]

Communication with non-government stakeholders

Just as local governments must work to overcome challenges and identify opportunities to enable local vehicle electrification, so too must residents, commercial operators, and fleet operators. Each of these parties have questions regarding EV adoption and choosing the right EVSE to meet their needs, yet each come with their own set of unique challenges to address. The state of Michigan and local units of government have a critical role to play in communicating with these different stakeholders to support them in their transition to vehicle electrification.

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[53] Illinois ComEd. "ComEd is Helping Fifteen More Illinois Communities Get EV Ready." August 2023. Available at https://poweringlives.comed.com/comed-is-helping-fifteen-more-illinois-communities-get-ev-ready/.

[54] Henry, D. Great Plains Institute. "National Electric Vehicle Community Readiness Program Launches." March 2024. Available at https://betterenergy.org/blog/national-electric-vehicle-community-readiness-program-launches/.

[55] Interstate Renewable Energy Council. "Charging Smart." Accessed June 2024. Available at https://irecusa.org/programs/charging-smart/.

[56] Stauner, L. Great Plains Institute. "Michigan and Ohio Communities Become the First EV Smart Cohort." June 2023. Available at https://betterenergy.org/blog/michigan-and-ohio-communities-become-the-first-ev-smart-cohort/.

[57] *Ibid.*

[58] *Ibid.*

[59] Henry, D. Great Plains Institute. "National Electric Vehicle Community Readiness Program Launches." March 2024. Available at https://betterenergy.org/blog/national-electric-vehicle-community-readiness-program-launches/.

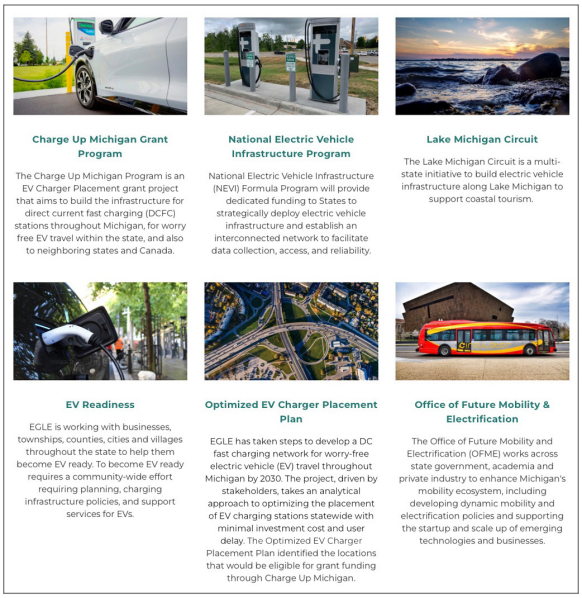
[60] Michigan Municipal League. "MI Funding Hub." Accessed June 2024. Available at https://mifundinghub.org/.

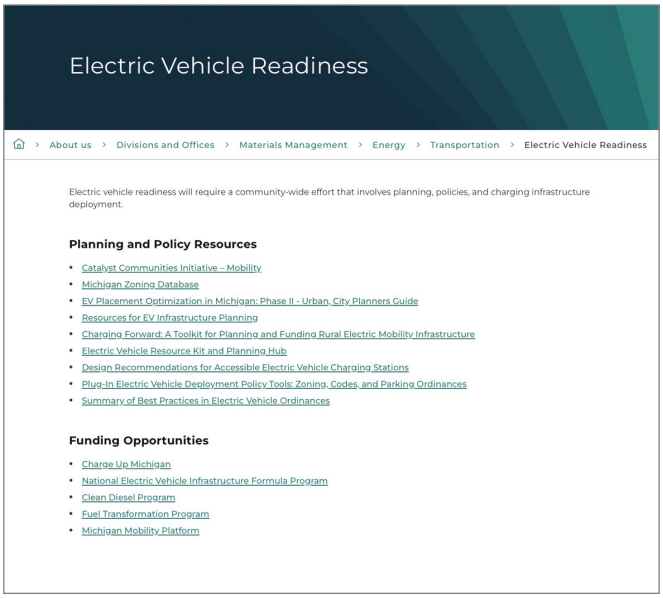
RECOMMENDATION

Develop efficient, comprehensive, and centralized tools to help different user types and communities install EV chargers.

Online and printed materials that can help address questions can be incredibly valuable, and the development of useful resources can help to minimize costly errors that may otherwise lead to frustration or project abandonment. These resources can be provided by state governments or local governments. The former may focus on statewide opportunities, including aiding local governments in developing plans to enable transportation electrification, economic opportunities, and zoning and permitting recommendations. In fact, many of the state of Michigan's departments and offices host information about transportation electrification.[61] EGLE, for example, hosts details on many state and federal resources, such as the Charge Up Michigan Grant, the Lake Michigan Circuit, and EV readiness (Figure 1).[62]

Figure 1: *Michigan EGLE's transportation resources (left)[63] and EV-readiness resources (right)[64]*





[61] Michigan Economic Development Corporation. Office of Future Mobility. "Business Development Services." Accessed June 2024. Available at https://www.michiganbusiness.org/services/.

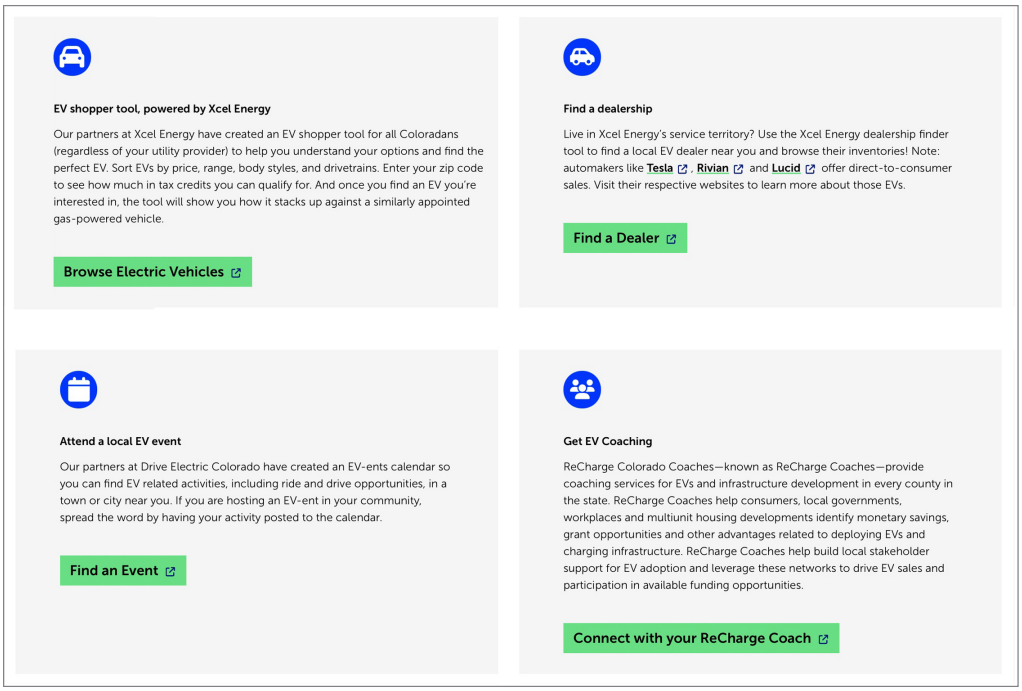
[62] Michigan Department of Environment, Great Lakes, and Energy. "Transportation." Accessed June 2024. Available at https://www.michigan.gov/egle/about/organization/materials-management/energy/transportation#:~:text=EGLE%20has%20taken%20steps%20to,investment%20cost%20and%20user%20delay.

[63] *Ibid.*

[64] Michigan Department of Environment, Great Lakes, and Energy. "Electric Vehicle Readiness." Accessed June 2024. Available at https://www.michigan.gov/egle/about/organization/materials-management/energy/transportation/electric-vehicle-readiness.

The state of Colorado also provides EV education to residents through its "EV CO" program, managed by the Colorado Energy Office and the Colorado Department of Transportation.[65] While more targeted to residential users, EV CO provides information to potential EV buyers to help them determine whether switching to an EV is right for them and, if so, how to make the change (Figure 2).

***Figure 2:** Colorado's residential EV education tools - Find Your EV*[66]



Local governments can also provide information to residents about EVs, EV charging, and where to find EVSE. For instance, Ann Arbor provides resources for residents looking to learn more about EVs (Figure 3).[67] The city of Boston's Department of Transportation also hosts information on the city's Recharge Boston Zero Emission Vehicle Program.[68] The website provides users information on the city's goals, charger installation, and incentive programs. It also features targeted material for new construction, workplace charging, and the rights of MFH residents.

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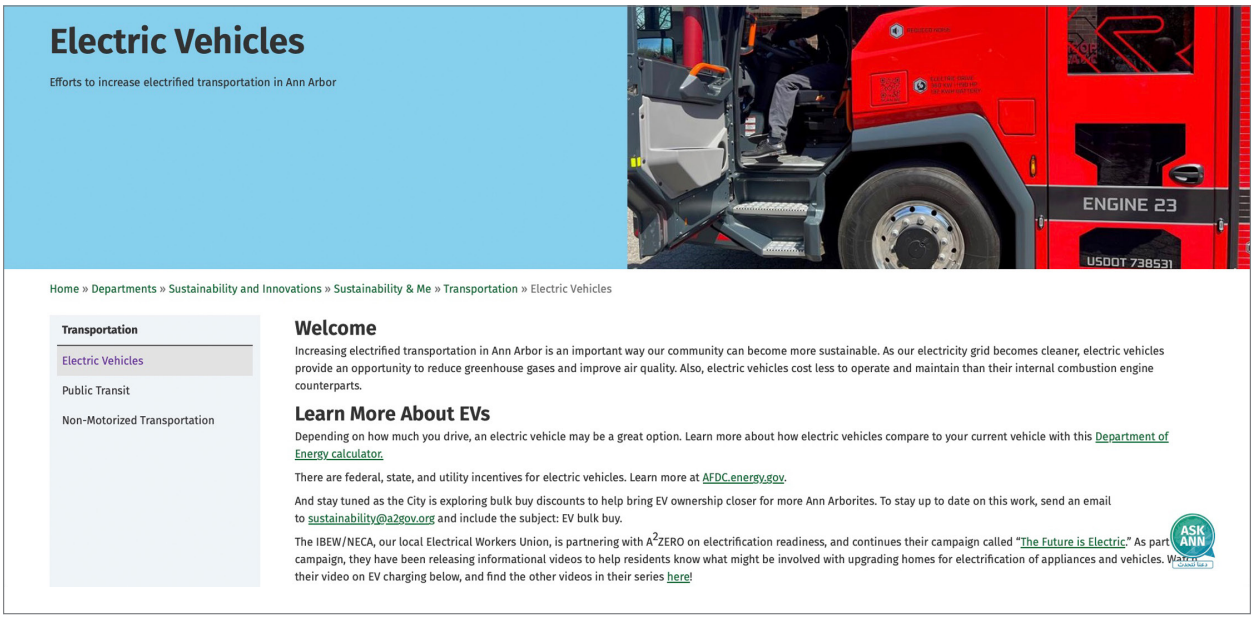
[65] State of Colorado. EV CO. "About EV CO." Accessed June 2024. Available at https://evco.colorado.gov/about.

[66] State of Colorado. EV CO. "Find Your EV." Accessed June 2024. Available at https://evco.colorado.gov/find-your-ev.

[67] City of Ann Arbor. "Electric Vehicles." Accessed June 2024. Available at https://www.a2gov.org/departments/sustainability/Sustainability-Me/transportation/Pages/Electric-Vehicles.aspx.

[68] City of Boston. "Recharge Boston: Boston's Zero Emission Vehicle Program." Accessed June 2024. Available at https://www.boston.gov/departments/transportation/recharge-boston-electric-vehicle-resources.

Figure 3: *The City of Ann Arbor - Electric Vehicles*[69]



Regardless of which entity is communicating the information, these resources should provide clear and consistent information to the various stakeholders to help answer questions they may have on EVs and EV charging, to guide them on the transportation electrification journey, and to do so by effectively informing them of relevant opportunities and potential challenges. To ensure consistency, state and local information resources should be updated regularly and reference one another where relevant. Perhaps most importantly, these resources must be user friendly and easy to find and navigate. These steps can help improve different residents' experiences in transitioning to EVs and choosing the right EVSE to suit their needs.

Section 3.3: Workforce

Across the Midwest, there has been an often-documented loss of human talent over the last several decades. This movement of college-educated or technically trained experts from the Midwest to other regions of the country, including the East and West Coasts, causes workforce challenges in states like Michigan.[70] It is clear that the growing clean energy economy presents an opportunity to regain and attract those talented individuals back to the Midwest. Michigan has a unique opportunity to attract talent in the transportation electrification space given the state's historical leadership in the automotive industry.

[69] City of Ann Arbor. "Electric Vehicles." Accessed June 2024. Available at https://www.a2gov.org/departments/sustainability/Sustainability-Me/transportation/Pages/Electric-Vehicles.aspx.

[70] Pope A. "Midwest 'Brain Drain' Persists and Job Opportunity is the Main Driver." *NPR.* February 2024. https://www.kcur.org/news/2024-02-02/midwest-brain-drain-persists-and-job-opportunity-is-the-main-driver.

In 2022, there were 1.1 million automotive or mobility jobs in Michigan, representing 20% of the state's total workforce.[71] As the industry moves toward production of EVs, special attention needs to be paid to assist Michigan's existing automotive workforce through the transition. In 2022, job growth in Michigan's clean vehicle sector surged by an impressive 14.4%, making it the state's fastest-growing clean energy job sector.[72]

RECOMMENDATION

Establish a robust talent pipeline for the clean mobility workforce to support operations and maintenance needs in the clean mobility sectors, including by supporting state funding for charger and EV maintenance programs at technical schools and community colleges, wrap-around services, soft skill training, and placement support.

The transition to EVs represents not only a technological evolution but also a critical economic pivot for the state. Recent programs and opportunities announced at the state and federal levels will help both attract new talent to Michigan's advanced mobility jobs and retrain existing automotive workers in new sectors of the industry. These initiatives include:

1. **Michigan Community and Worker Economic Transition Office**
   To support the workforce through this transition, Michigan has established the Community and Worker Economic Transition Office.[73] This proactive initiative focuses on addressing challenges and harnessing opportunities presented by the shift to EVs and other clean energy technologies. By ensuring that no community is left behind and amplifying economic benefits for workers, communities, and businesses, this new Office aims to create a smooth and inclusive transition. The Office is tasked with developing strategies to anticipate the needs of employees and provide resources and support to those directly impacted by changes in the industry.

[71] Detroit Regional Chamber. "Automotive and Mobility." Accessed June 2024. Available at https://www.detroitchamber.com/research/regional-overview/industries/automotive-mobility/#:~:text=1.1%20million%20automotive%20or%20mobility,6x%20higher%20than%20national%20average.

[72] Clean Jobs Midwest. "Michigan Clean Energy and Transportation are Growing." 2023. Available at https://www.cleanjobsmidwest.com/state/michigan.

[73] Michigan Department of Labor and Economic Opportunity. "Community & Worker Economic Transition Office." Accessed June 2024. Available at https://www.michigan.gov/leo/bureaus-agencies/economic-transition.

CASE STUDY

Detroit-based Walker-Miller Energy Services is the prime Implementation Contractor of ComEd's Beneficial Electrification investment of $231 million in northern Illinois, and the prime subcontractor of the Ameren Illinois' Beneficial Electrification program, where they are managing transportation electrification programs that promote equitable access to EVs and supporting infrastructure.[74] Under these two programs, Walker-Miller is recruiting and managing EV service provider (EVSP) networks that can ensure quality installations for customers as well as advance recruiting of electricians, especially minority-based organizations, to become certified to complete EVSE installations.

Recognizing the lack of diversity in the EV space and concerned that diverse communities would be left behind without some intervention, Walker-Miller undertook a concerted effort and financial investment four years ago to research the gaps and enter the EV infrastructure ecosystem to make space for themselves as well as other diverse participants. Walker-Miller is a certified Tesla installer and works with other minority installers to get them trained to complete Tesla installs through their certification. Walker-Miller also partners with other EVSE manufacturers like Dunamis Energy, ChargePoint, EV Connect software and their hardware partners.

Walker-Miller Energy Services runs various workforce development programs in the energy sector that emphasize both technical and soft skills, offering industry-recognized certifications and hands-on experience through real-world projects. These programs are designed to engage underrepresented communities and provide career counseling, job placement assistance, and wrap-around support services such as transportation, childcare, and meals. By focusing on diverse and local recruiting, weekly employment readiness workshops, and a strong alumni network, Walker-Miller ensures that participants are well-prepared for sustainable careers in the energy sector. For example, in partnership with DTE, Walker-Miller Energy Service's Energy Efficiency Academy recently received an official certification as a Michigan Proprietary School, offering paid training for participants historically excluded from the energy industry.[75] As part of a commitment to equity, Walker-Miller is working with local providers of the Society of Automotive Engineering EVSE technician training to help source jobs for those receiving certifications.

2. EV Jobs Academy

LEO, in collaboration with the Workforce Intelligence Network, operates the EV Jobs Academy. The EV Jobs Academy represents a proactive approach to workforce development, leveraging public-private partnerships to address the talent needs of the EV industry. With over 100 partners engaged in the program, including employers, labor organizations, and educational institutions, the EV Jobs Academy aims to develop industry-led education and training solutions tailored to the evolving demands of the clean mobility sector. Through strategic partnerships and innovative training initiatives, the program is helping to equip workers with the skills and expertise needed to thrive in the growing EV industry, ensuring that Michigan remains at the forefront of automotive innovation.

3. State Workforce Plan

In March 2024, Governor Whitmer unveiled Michigan's first-ever statewide workforce plan, including recommendations tailored to equip the existing workforce with the skills necessary for the electrified mobility future.[76] This comprehensive plan emphasizes the importance of reskilling and upskilling Michigan's workers to ensure that current auto industry

[74] Electric Vehicle Charging and Infrastructure. "ComEd and Millennium Garages plan for 300 EV chargers by 2026." October 2023. Available at https://www.evcandi.com/news/comed-and-millennium-garages-plan-300-ev-chargers-2026#:~:text=To%20accelerate%20EV%20adoption%20and,like%20heat%20pumps%2C%20at%20home.

[75] DTE. "Energy Efficiency Academy." Accessed August 2024. Available at https://empoweringmichigan.com/energy-efficiency/.

[76] Michigan Department of Labor and Economic Opportunity, Michigan Economic Development Corporation, and Michigan Department of Lifelong Education, Advancement, and Potential. "The Michigan Statewide Workforce Plan." March 2024. Available at https://www.michigan.gov/leo/-/media/Project/Websites/leo/Documents/MWDB/MI-State-Workforce-Plan.pdf?rev=c625cfcf3a314189be93694c987cf65e.

workers can transition seamlessly into roles within the clean mobility sector. The plan includes a robust framework for helping Michiganders obtain new skills and certifications, along with support for specialized training programs, like the ChargerHelp! EVSE repair technician program in Michigan Central, to prepare workers for the nuances of clean mobility technology production and maintenance.[77]

CASE STUDY

Beginning in the Fall of 2023, ChargerHelp! launched a partnership with and is supporting Michigan Central in the Electric Vehicle Supply Equipment Technician Training Program. Through this program, Michigan residents will learn the skills necessary to service and maintain the growing number of EV charging stations in the State. Graduates from the program will have the opportunity to become certified EVSE Technicians after passing the industry-backed standardized test developed by the Society of Automotive Engineers (SAE) International. The program produced its first graduates in February 2024, and its second in April 2024. This first-of-its-kind program addresses the growing need for a foundational knowledge of EV charging and allows certified technicians to service and maintain Michigan's expanding EV Charging Infrastructure.

Additionally, in July 2024, the Goodwill Clean Tech Accelerator announced the graduation of its first cohort to help unemployed and underemployed workers go through job training in Detroit, MI for careers aimed at fighting climate change.[78] This program, in partnership with ChargerHelp!, took 12 students through test labs and an introductory EV charger technician training.[79] By developing similar partnerships like that with ChargerHelp!, the Accelerator is seeking to expand to over 20 cities in the next seven years to meet the increasing demand for green jobs.[80]

4. EV Workforce Hub

In April 2024, the Biden administration announced a partnership between the Federal Departments of Labor and Energy and the state of Michigan to create an EV Workforce Hub.[81] The White House has designated nine similar workforce hubs across the country. Designation as a workforce hub represents a commitment from the federal government to provide financial and technical assistance to local and state entities assisting workers to enter new careers in the clean energy sector following recent large-scale investment. The designation as an EV Workforce Hub underscores Michigan's comprehensive involvement in the automotive industry's transition, highlighting the impact and opportunities that extend well beyond Southeast Michigan. The Workforce Hub is designed to cultivate a domestic, diversified EV supply chain and retain high-quality, good-paying jobs within the state. This federal support is critical in ensuring that Michigan remains a central hub for automotive innovation and reinforces the state's ability to adapt and thrive.

Together, these state and federal efforts create a robust framework for Michigan's workforce development during the transition to clean mobility. The transition to electric mobility could add as many as 56,000 jobs in auto manufacturing in Michigan by 2030, but job growth will be contingent on the state's ability to support its existing workforce through the transition.[82]

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[77] Michigan Central. "EVSE Training Program." Accessed June 2024. Available at https://michigancentral.com/chargerhelp/.

[78] Peter, A. "The Detroit Goodwill wants to be the center of a new EV workforce." *Fast Company.* July 2024. Available at https://www.fastcompany.com/91151211/goodwill-green-job-training.

[79] *Ibid.*

[80] *Ibid.*

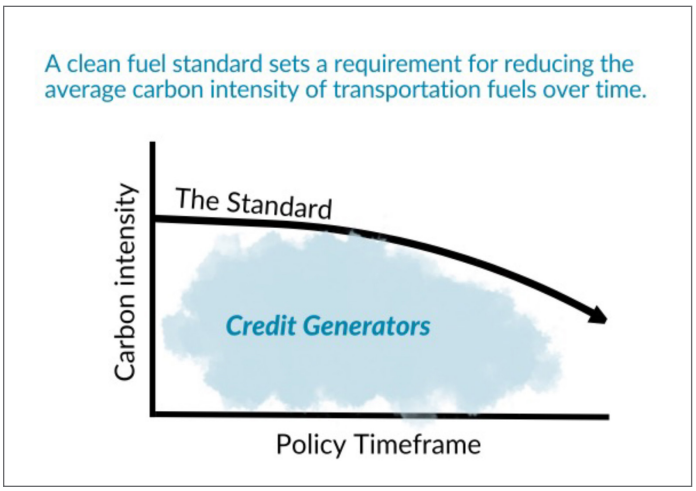
[81] The White House. "Fact Sheet: President Biden Announces New Workforce Hubs to Train and Connect American Workers to Good Jobs Created by the President's Investing in America Agenda." April 2024. Available at https://www.whitehouse.gov/briefing-room/statements-releases/2024/04/25/fact-sheet-president-biden-announces-new-workforce-hubs-to-train-and-connect-american-workers-to-good-jobs-created-by-the-presidents-investing-in-america-agenda/.

[82] World Resources Institute. "A Roadmap For Michigan's Electric Vehicle Future." Accessed June 2024. Available at https://publications.wri.org/michigan-ev-future/executive-summary.

Section 3.4: Clean Fuel Standard

Building out a sufficient charging network will be a significant investment and creating a CFS represents one of the most promising opportunities to support transportation electrification so that the infrastructure is self-sustaining. A CFS sets targets for reducing the carbon intensity (CI) of all fuels in the transportation sector. The CI is a full life cycle analysis of the greenhouse gas emissions associated with the production, distribution, and consumption of a fuel.[83]

Figure 4: *CI changes due to implementation of a CFS*[84]



Providers that produce fuel with fewer emissions than the CI standard generate credits, whereas those above the standard must reduce the CI of their fuel by blending it with lower CI fuels, invest in efficiencies within fuel production to lower the CI of their fuel, or purchase credits to offset their higher CI.[85] A CFS supports a diversified transportation fuels market by requiring the reduction of the average CI of transportation fuels over time and allowing all fuel providers to participate. Given that the CI is based on a comprehensive life cycle analysis, a CFS promotes innovation to reduce emissions throughout the transportation fuel value chains. Perhaps most importantly, the sale of credits can be used to finance additional investments such as to support the construction of more EV charging stations.[86]

California has the nation's longest-running CFS program, which is called the low-carbon fuel standard (LCFS).[87] Under the AB 32 Scoping Plan, the California Air Resources Board approved the LCFS in 2009, which was amended in 2018 by SB 32 to include credit opportunities for ZEV adoption and infrastructure, and other advanced technologies to decarbonize the transportation sector.[88] Oregon and Washington have also implemented similar programs. Oregon passed HB 2186[89] authorizing its Environmental Quality Commission to adopt a low carbon fuel standard later in 2009, and in 2021 Washington[90] became the third state to adopt a CFS. In 2024, New Mexico became the 4th state to adopt the policy, signaling a growing momentum toward CFS' across the country.

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[83] Tesfaye, M. *et al.* Bipartisan Policy Center. "Designing a Bipartisan Federal Clean Fuel Standard: Roundtable Takeaways." January 2024. Available at https://bipartisanpolicy.org/download/?file=/wp-content/uploads/2024/01/BPC_Energy-Low-Carbon-Fuel_Roundtable_Takeaways_Jan_2024.pdf.

[84] Michigan Clean Fuel Standard Coalition. "Michigan Clean Fuel Standard." Accessed August 2024. Available at https://23168950.fs1.hubspotusercontent-na1.net/hubfs/23168950/Clean%20Fuels%20Standard/Face%20Sheet/MiCFS_Fact%20Sheet_2023-0424.pdf.

[85] *Ibid.*

[86] Electrification Coalition. "Clean Fuel Standard: Policy and Potential for Accelerating EV Adoption." Accessed June 2024. Available at https://electrificationcoalition.org/resource/clean-fuel-standards/.

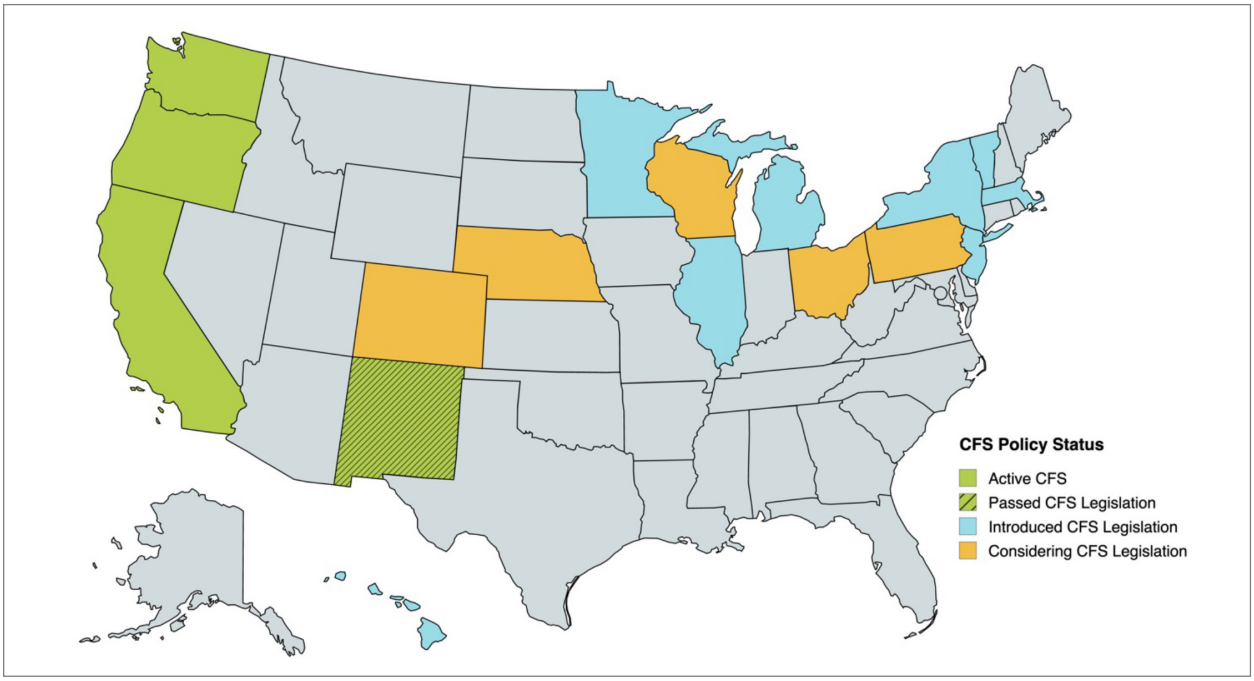
[87] California Air Resources Board. "Low Carbon Fuel Standard." 2024. Available at https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/about#:~:text=The%20Board%20approved%20the%20LCFS,implementation%20on%20January%201%2C%202011.

[88] California Air Resources Board. "Low Carbon Fuel Standard." Accessed June 2024. Available at https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/about.

[89] Oregon Secretary of State. Department of Environmental Quality. Chapter 30, Division 253: Oregon Clean Fuels Program. Accessed June 2024. Available at https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=1560.

[90] Washington State Legislature. Chapter 70A.535: Transportation Fuel - Clean Fuels Program. Accessed June 2024. Available at https://app.leg.wa.gov/RCW/default.aspx?cite=70A.535.

Figure 5: *CFS policies across the U.S.*



Other states, including New York, Illinois, and Minnesota, have bills introduced to implement a CFS, but none have yet been successful in passing the legislation. Additionally, Canada has adopted a nationwide CFS with targets to reduce the CI of transportation fuels by 15% by 2030.[91] Similar programs, such as the Transportation Climate Initiative, which creates a binding carbon emissions cap and requires fuel suppliers to purchase allowances auctioned by participating jurisdictions, have been adopted in northeast and mid-atlantic states.

Notably, the three states with an active CFS (California, Oregon, and Washington) are the top three states in terms of EV adoption per capita[92] and in terms of 2023 EV market share.[93] This correlation underscores the effectiveness of CFS' in driving EV adoption by establishing a credit market that incentivizes the production and use of low-carbon transportation fuels, including electricity for EVs. Revenues generated from these credits are often reinvested in infrastructure to support clean vehicle deployments, further accelerating the transition to cleaner transportation options. In California, the LCFS has yielded significant environmental benefits, displacing over 25 billion gallons of petroleum fuels with low-carbon alternatives, resulting in a 12.6% reduction in the carbon intensity of California's transportation fuels.[94] Additionally, the program has provided approximately $4 billion annually to support low-carbon investments.[95]

RECOMMENDATION

Pass new legislation to establish and implement a Clean Fuel Standard.

[91] Government of Canada. "What Are the Clean Fuel Regulations." Accessed July 2024. Available at https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-regulations/about.html.

[92] U.S. Department of Energy. Alternative Fuels Data Center. "TransAtlas." Accessed June 2024. Available at https://afdc.energy.gov/transatlas#/?year=2022&view=per_capita&state=CA.

[93] Alliance for Automotive Innovation. "Get Connected: Electric Vehicle Quarterly Report." 2023. Available at https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023%20Q4.pdf.

[94] California Air Resources Board. "Low Carbon Fuel Standard 2023 Amendments: Standardized Regulatory Impact Assessment." September 2023. Available at https://ww2.arb.ca.gov/sites/default/files/2023-09/lcfs_sria_2023_0.pdf.

[95] *Ibid.*

In April 2023, a bill was introduced to establish a CFS in Michigan.[96] This legislation would require a 35% reduction in the CI of transportation fuels by 2035. Modeling suggests that adopting the policy would result in approximately $12 billion in economic benefits in Michigan through 2035. Over 13 years, the program is projected to create $6.6 billion in credit revenues just within the electricity producer and EV charging provider sectors.[97] This credit market would create a significant additional revenue stream to expand charging infrastructure and bolster EV adoption across the state.

Figure 6: *Economic benefit of a CFS in Michigan*[98]

Multi-Sector Growth

By 2035, the annual credit revenue generated by alternative fuel production is predicted to be between $800-900 million.

SECTOR	Average Annual Benefit (2023 - 2035)	Total Benefit (Over 13 years)
Gasoline Users (Households)	$40 million	**$524 million**
Diesel Consumers (Trucking)	$23 million	**$299 million**
Electricity Producers and Charging Providers	$511 million	**$6.6 billion**
Ethanol Producers and Farmers	$236 million	**$3.1 billion**
Biodiesel Producers and Farmers	$31 million	**$406 million**
Renewable Diesel Producers	$49 million	**$633 million**
RNG Producers	$54 million	**$697 million**

In addition to its economic benefits, the policy would enhance public health and environmental quality statewide because a CFS is projected to result in a 27% reduction in emissions from the transportation sector by 2035.[99]

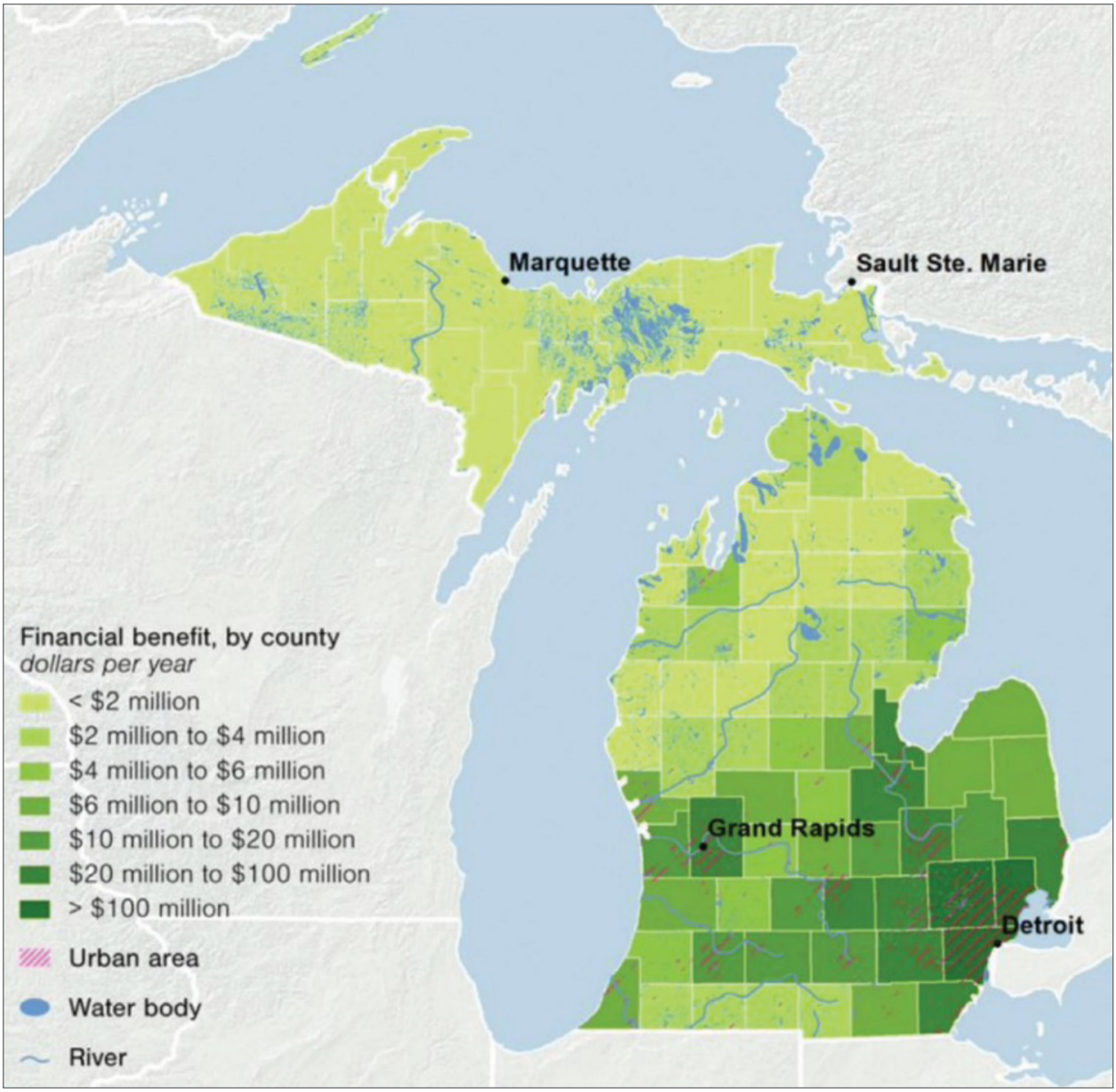
[96] Michigan Legislature. Senate Bill 275. June 2023. Available at https://www.legislature.mi.gov/Bills/Bill?ObjectName=2023-SB-0275.

[97] Michigan Clean Fuel Standard Coalition. "Economic Benefit." Accessed July 2024. Available at https://23168950.fs1.hubspotusercontent-na1.net/hubfs/23168950/MICFS_Fact%20Sheet_Economic_2024-0311.pdf.

[98] *Ibid.*

[99] Michigan Clean Fuel Standard Coalition. "Air Quality Benefit." Accessed July 2024. Available at https://23168950.fs1.hubspotusercontent-na1.net/hubfs/23168950/Clean%20Fuels%20Standard/Fact%20Sheets/MICFS_Fact%20Sheet_AirQuality_2024.pdf.

Figure 7: *Air quality benefits of a CFS in Michigan*[100]



A CFS was included as a key strategy to decarbonize the transportation sector in the Governor's MI Healthy Climate Plan and is endorsed by the Michigan Council on Future Mobility and Electrification.[101] The policy is also supported by more than 65 organizations in the Michigan Clean Fuel Standard Coalition, representing a variety of sectors including automotive, EV charging, aviation, agriculture, environmental nonprofits, community advocates, trade associations, and more.[102]

[100] *Ibid.*

[101] Michigan Department of Environment, Great Lakes, and Energy. "MI Healthy Climate Plan." April 2022. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Offices/OCE/MI-Healthy-Climate-Plan.pdf?rev=d13f4adc2b1d45909bd708cafccbfffa.

[102] Michigan Clean Fuel Standard Coalition. "Supporters." Accessed July 2024. Available at https://standard.cleanfuelsmi.org/supporters.

SECTION 4: CURRENT STATE OF TRANSPORTATION ELECTRIFICATION: CHARGING INFRASTRUCTURE

Section 4.1: Zoning and Permitting

In its *Planning and Zoning Guidance for Electric Vehicle Charging Deployment*, the Interstate Renewable Energy Council (IREC) and RMI (formerly Rocky Mountain Institute) indicate that most local zoning and permitting requirements are not written to accommodate EV charging infrastructure.[103] This, coupled with the capacity and resource constraints to manage applications at the local level, has led to high lag times in project development.[104] According to the same report, one studied EVSP experienced a median time frame for project permitting of 51 business days, and some projects were stuck in permitting for over a year.[105] Because of these delays, EVSPs may be hesitant to engage with those jurisdictions where unclear local guidance hinders development and leads to burdensome project delays. Consequently, it is imperative that municipalities and EVSPs have "transparent and predictable requirements for charger installation and a straightforward approval process."[106]

To address this, some states, like California and New Jersey, have instead established statewide zoning ordinances or permitting processes for EVSE. For example:

- California's Planning and Zoning Law (AB 1236), enacted in 2015, set consistent statewide permitting standards to achieve efficient and cost-effective installations of EV charging infrastructure.[107] California AB 970 updated the Planning and Zoning Law with specific timelines for the review and approval of EV charger applications.[108]
- New Jersey Governor Murphy signed Public Law 2021, Chapter 171 into law, which required that EVSE and make-ready parking space applications be considered a permitted accessory use and structure in all zoning districts.[109] Public Law 2021, Chapter 171 also required the New Jersey Department of Community Affairs to develop a model statewide municipal EV ordinance to serve as a guide for municipalities.

In Michigan, unlike building codes, zoning ordinances that determine how different areas of land can be used are updated at the discretion of the local unit of government, as set out in the Zoning and Enabling Act.[110] Because EVs and EVSE are still relatively new, particularly in low-income (LI) and rural communities, provisions for EV charging have not yet been incorporated into many local plans and zoning ordinances. This can lead to a confusing and drawn-out approval process. Including EVSE-specific language in master plans, updating zoning ordinances, and streamlining the permitting process alleviates undue burden on already capacity constrained authorities having jurisdiction (AHJ). Perhaps more importantly, taking these steps creates a more user-friendly experience that helps encourage EVSE deployment. To further realize these benefits, the development of model zoning ordinances and permitting processes can help create consistency. State departments, like the EGLE, and regional organizations, like SEMCOG and the Michigan Municipal League (MML), are

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[103] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[104] Northeast States for Coordinated Air Use Management. "Improving Permitting and Zoning for EV Fast Charging Stations: Strategies for State and Local Action." December 2023. Available at https://www.nescaum.org/documents/ev-charger-permit-and-zoning-streamlining-fs-12-05-23.pdf.

[105] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[106] *Ibid.*

[107] California Legislature. California Assembly Bill No. 1236. "Local Ordinances: Electric Vehicle Charging Stations." October 2015. Available at https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB1236.

[108] California Legislature. California Assembly Bill No. 970. "Planning and Zoning: Electric Vehicle Charging Stations." October 2021. Available at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB970.

[109] New Jersey Legislature. New Jersey P.L. 2021, Chapter 171. July 2021. Available at https://pub.njleg.gov/bills/2020/PL21/171_.HTM.

[110] Michigan Legislature. Michigan Public Act 110 of 2006. "Michigan Zoning Enabling Act." July 2006. Available at https://www.legislature.mi.gov/Laws/MCL?objectName=mcl-act-110-of-2006.

well suited to develop model codes and ordinances, and work with local municipalities to align the application and review processes. AHJs such as local zoning boards, can take the following steps to better prepare for increased EV adoption and streamline the permitting process:[111, 112, 113]

1. **Include EVs and EV chargers in comprehensive plans.** Comprehensive plans set important goals to guide local departmental decision making, and ensuring alignment across agencies enables consistent deployment across localities. Throughout the planning process, AHJs should strive to mitigate concerns of inequitable access to charging.

RECOMMENDATION

Require state agencies including the DTMB, EGLE, LARA, LEO, MDOT, MPSC, and others, to use the state's 100,000 charger/2 million EV deployment goal in their planning and evaluation criteria.

The following plans from cities in Michigan and other states that highlight EV charging as a key mechanism to meet climate goals:

- In late 2023, Detroit City Council released its Climate Strategy, which includes plans to install over 200 public EV chargers, pilot EV carshare services, and adopt an ordinance requiring that 20% of spaces in new developments be EV-C.[114]
- The City of Ann Arbor, in its 2020 Living Carbon Neutrality Plan (called A2Zero) set goals to improve access to EVs and EV charging. The plan indicates that 10% of all public and private parking spaces should be equipped with Level 2 chargers and 2% with DCFC.[115]
- Following the publication of its Mobility Action Plan in 2017,[116] which set a target that 40% of all vehicle registrations be EVs by 2030, the City of Denver released its 80 x 50 Climate Action Plan in 2018.[117] The latter set aggressive goals for decarbonizing transportation including advocating for the adoption of a zero emission vehicle (ZEV) standard, increasing the number of publicly available charging stations, and creating building codes that require charging opportunities at multifamily housing (MFH) and workplaces.
- In its 2022 Climate Action Plan, the City of Chicago acknowledged that among the city's 77 community areas, 70% of public EVSE was concentrated in three community areas and 47 community areas had zero EV chargers.[118] The Climate Action Plan calls for the installation of 2,500 new public Level 2 EV charging stations with priority given to low- and middle-income communities. In the 2024 Priority Climate Action Plan for the Chicago Metropolitan

[111] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[112] Northeast States for Coordinated Air Use Management. "Improving Permitting and Zoning for EV Fast Charging Stations: Strategies for State and Local Action." December 2023. Available at https://www.nescaum.org/documents/ev-charger-permit-and-zoning-streamlining-fs-12-05-23.pdf.

[113] Cooke, C. and B. Ross. "Summary of Best Practices in Electric Vehicle Ordinances." Great Plains Institute. July 2019. Available at https://www.betterenergy.org/wp-content/uploads/2019/06/GPI_EV_Ordinance_Summary_web.pdf.

[114] City of Detroit. "Detroit Climate Strategy Executive Summary." 2023. Available at https://detroitmi.gov/sites/detroitmi.localhost/files/2023-11/Detroit%20Climate%20Strategy%20Executive%20Summary.pdf.

[115] City of Ann Arbor. "Ann Arbor's Living Carbon Neutrality Plan." April 2020. Available at https://www.a2gov.org/departments/sustainability/documents/a2zero%20climate%20action%20plan%20_3.0.pdf.

[116] City of Denver. "Denver's Mobility Action Plan." July 2017. Available at https://www.denvergov.org/files/assets/public/v/2/mayor/documents/programs-amp-initiatives/denvers-mobility-action-plan-2017.pdf.

[117] City of Denver. "City of Denver 80 x 50 Climate Action Plan." July 2018. Available at https://www.denvergov.org/files/assets/public/v/1/climate-action/documents/ddphe_80x50_climateactionplan.pdf.

[118] City of Chicago. *2022 CAP: Chicago Climate Action Plan.* 2022. Available at https://www.chicago.gov/content/dam/city/sites/climate-action-plan/documents/Chicago-CAP-071822.pdf.

Statistical Area, the Metropolitan Mayors Caucus identifies that increasing the number of accessible charging ports and amending local ordinances to enable investment in safe and accessible clean fueling infrastructure are essential measures to enable the decarbonization of transportation.[119]

2. **Assess local needs and coordinate with key stakeholders to effectively plan EVSE deployment.** In developing these plans, localities can lean on metropolitan and regional planning organizations and councils of government to ensure the proposed plans are feasible and appropriately address climate goals and EV charging needs in the area. Collaboration with local utilities to ensure the grid has capacity to meet forecasted demand and alignment between the localities' and utilities' plans is also imperative.

RECOMMENDATION

Conduct a granular EVSE needs assessment that considers EV adoption growth, different types of chargers in various settings and market segments, equitable charger deployment, the implementation of innovative solutions, and the projected utility load growth required.

RECOMMENDATION

Require Michigan's utilities to provide up-to-date publicly available bidirectional hosting capacity maps to provide sufficient detail to allow right-sizing of installed EV chargers and installation of EV chargers in locations with sufficient distribution infrastructure.

To support these assessments and fortify existing resources, Michigan should conduct a granular needs assessment and require utilities to provide hosting capacity maps, both of which will assist local governments and community leaders identify charging development opportunities. Currently in Michigan, local governments, community leaders, and residents can refer to several resources for key data and background information that will help inform optimal EVSE placement (Table 3).

[119] Metropolitan Mayors Caucus. "Priority Climate Action Plan for the Chicago Metropolitan Statistical Area." March 2024. Available at https://mayorscaucus.org/wp-content/uploads/2024/03/Chicago-MSA-PCAP-3-4-24-FINAL.pdf.

Table 3: Planning and optimal EV placement tools for Michigan stakeholders

Title	Organization	Description
State of Michigan's Community EV Toolkit	SEMCOG	This resource provides the status of local EV charging infrastructure and deployment, best practices for community zoning and planning ordinances, and information on fleet electrification.[120] The Mapping Tool primarily focuses on EV charger deployment and adoption and highlights the projected number of chargers required to meet varying levels of projected demand due to EV uptake.[121] The Southeast Michigan Council of Governments (SEMCOG) and AECOM also collaborated to develop a guide on optimal EVSE siting for governors to equitably build out the regional EVSE network.[122]
EPRI's EVs2Scale eRoadMAP	EPRI	This interactive map developed by the Electric Power Research Institute (EPRI) and its industry partners, presents the approximate amount of energy needed at a local level to electrify transportation over time for light-, medium-, and heavy-duty EVs.[123] It aims to support users by highlighting areas where multiple customers may be clustered around one or two feeders, and can help foster discussions between a utility and customer to support proactive infrastructure planning.
Consumers Energy Hosting Capacity Map	Consumers Energy	Like EPRI's eRoadMAP, this tool identifies portions of Consumers Energy's service territory where primary voltage interconnection may be more available.[124] Hosting capacity is an estimate of the amount of distributed energy resources (DERs) that can be accommodated on the distribution system without impacting power quality and reliability to all customers or requiring infrastructure upgrades. In the future, as described in *Section 6.6*, this map may be updated to provide bidirectional data to show areas where EV charging stations can most easily be interconnected.
DTE Energy's Hosting Capacity Map	DTE Energy	Like EPRI's eRoadMAP, this tool identifies portions of DTE's service territory where primary voltage interconnection may be more available.[125] In the future, as described in *Section 6.6*, this map may be updated to provide bidirectional data to show areas where EV charging stations can most easily be interconnected.
MICHauto Automobility Asset Map	MICHauto	This tool identifies Michigan-wide industry assets, partnership opportunities, and resources for local municipalities to leverage in enabling transportation electrification.[126]

[120] Southeast Michigan Community. "State of Michigan Community EV Toolkit." Accessed June 2024. Available at https://southeast-michigan-ev-resource-kit-and-planning-hub-semcog.hub.arcgis.com/.

[121] Southeast Michigan Community. "The Mapping Tool." Accessed June 2024. Available at https://ev-energi.maps.arcgis.com/apps/mapviewer/index.html?webmap=145d9fd7fb7a44b084115939e846715a.

[122] AECOM. "Siting Optimal Charging Infrastructure in Southeast Michigan." March 2023. Available at https://www.semcog.org/desktopmodules/SEMCOG.Publications/GetFile.ashx?filename=Siting%20Optimal%20Charging%20Infrastructure%20in%20Southeast%20Michigan.pdf.

[123] Electric Power Research Institute. "EVs2Scale eRoadMAP." Accessed June 2024. Available at https://eroadmap.epri.com/.

[124] Consumers Energy. "Hosting Capacity Map." Accessed June 2024. Available at https://cms.maps.arcgis.com/apps/instant/lookup/index.html?appid=b90ff63b338043b7bcae43dd685a419d.

[125] DTE Energy. "Hosting Capacity Map." Accessed June 2024. Available at https://www.arcgis.com/apps/webappviewer/index.html?id=64e9f4e0f82c42e7b7ed847273ec2764.

[126] MICHauto. "MICHauto Automobility Asset Map." Accessed June 2024.

3. **Update zoning codes to more appropriately classify EVSE and set EV parking standards.** As of spring 2023, 37 communities in Michigan have EV ordinances, ranging from allowing EV-only parking spaces to adopting a comprehensive Unified Development Code.[127] Due to the limited deployment of EVSE, zoning ordinances, particularly in LI and rural communities, may not appropriately classify this equipment, if it is classified at all. In the absence of clear zoning requirements, planning departments and zoning boards are responsible for interpreting existing local ordinances to determine whether a project meets the necessary approval criteria.

RECOMMENDATION

Develop model zoning ordinances that specifically address EVSE for various use cases and use model ordinances to support education of local jurisdictions.

To alleviate AHJ capacity constraints and enable shorter project timelines, local AHJs should:

- ***Depending on the use case, amend local ordinances to classify EV charging stations as a permitted accessory use.***[128] By definition, an accessory use classification refers to a use incidental to, and on the same lot as, a principal use. An example of this is a charging station in the parking lot of a shopping mall or grocery store. The accessory use classification allows a lesser degree of administrative review. EVSE that is defined as accessory use is therefore less likely to experience delays related to zoning approval. Consider the following references from existing legislation and codes:
  - *New Jersey - Model Ordinance, Section C, Approvals and Permits, Subsection C.1*:[129] "An application for development submitted solely for the installation of EVSE or Make-Ready parking spaces shall be considered a permitted accessory use and permitted accessory structure in all zoning or use districts and shall not require a variance pursuant to C.40:55D-70."
  - *The Township of Edison, New Jersey - Section 14-7, Electric Vehicle Charging Stations in New and Modified Developments Required, Subsection 14-7b*:[130] "Electric vehicle charging equipment (EVCE) and electric vehicle charging stations (EVCS) shall be considered permitted accessory uses in all zoning districts. Electric vehicle charging equipment and electric vehicle charging stations shall be permitted accessory uses in all zoning districts of the Township of Edison, subject to the limitation that an electric vehicle charging station located on the property of a one- to four-family home shall not be made available for use of the general public."
  - *Saratoga Springs, New York - Unified Development Ordinance, Section 9.5., Accessory Structures and Uses, Subsection 1, Electric Vehicle Charging Station, Section 1.2*:[131] "Electric vehicle charging stations are permitted as an accessory use within any principal or ancillary parking facility, or gas station, located within the area of designated vehicle parking spaces."

[127] Historically, zoning codes have been piecemeal, separating different sectors of the community into residential, commercial, office use, etc. This, however, can lead to a disjointed vision for the community and confusion among community members and AHJ administrators, stifling development. A Unified Development Code is a single document that brings together all development related regulations, which can allow for a more cohesive and holistic approach to community development.

[128] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[129] State of New Jersey. Department of Community Affairs. "DCA Model Statewide Municipal EV Ordinance." Accessed June 2024. Available at https://www.nj.gov/dca/dlps/home/modelEVordinance.shtml.

[130] Township of Edison, New Jersey. Unified Development Code: Section 14-7. "Electric Vehicle Charging Stations in New and Modified Developments Required, Subsection 14-7b." May 2024. Available at https://ecode360.com/36876907?highlight=section&searchId=45726203034291904#36876907.

[131] Saratoga Springs, New York. Unified Development Code: Article 9. "On-Site Development Standards." September 2021. Available at https://www.saratoga-springs.org/DocumentCenter/View/14432/Article-9-On-Site-Development-Standards.

- ***When the charging stations are the primary use, allow for the classification as an approved use with streamlined permitting and zoning review.***[132] Some installations, like a charging station hub where the primary draw to that location is the EV charging, may warrant the primary use classification due to the use case and location of the charging station. These hubs may affect traffic patterns, which may require more safety considerations by the AHJ. The exceptions or events that trigger a zoning board review should be clearly articulated in the zoning ordinance. AHJs should remain in contact with the local utility to ensure that the utility is aware of potential charging installations and can assess the impact on the capacity of the local grid. Consider the following reference from existing legislation and codes:
  - *Fairfax County, Virginia - Applicable Zoning Provisions for Electric Vehicle Charging Spaces*:[133] "All EVC spaces, whether permitted as an accessory or a principal use, may be subject to electrical and/or building permit approval and may require site plan approval if there is land disturbance of more than 2,500 square feet."

In addition to zoning ordinances related to the classification of EVSE, zoning can also address EV readiness standards including specific EV parking standards. Because EV charging takes place while the vehicle is parked, EV charging and parking of EVs are inextricably linked. Consequently, setting parking requirements that specifically address EV needs can be a critical step for AHJs to take in supporting public charging opportunities. EV parking is often classified according to the degree that the parking space is able to support EV charging. Common classifications for EV parking spaces are:[134]

- *EV-Capable (EV-C)*: These parking spaces have the wiring and conduits in place for EVSE, but do not have any dedicated circuits or EVSE installed. The infrastructure would, however, accommodate the installation of an EV charger in the future.
- *EV-Ready (EV-R)*: In addition to wiring and conduits, these parking spaces include the installation of circuits, panel capacity, receptacles, and overprotection devices. They can immediately receive an EV charger if and when needed.
- *EV-Installed (EV-I)*: All electrical work is complete and an EV charger is installed at the parking space.

AHJs should consider the following when incorporating EV language into local zoning and parking standards:[135]

- ***Establish EV-Readiness Parking Requirements.*** Mandates like this ensure that all new construction is poised for the transition to electric transportation. Several municipalities across the U.S. have implemented robust EV parking standards.
  - In 2019, the City of Seattle set EV-R parking space guidelines in its municipal code for new construction, requiring that 20% of parking spaces in new MFH developments and 10% of parking spaces in nonresidential developments must be EV-R.[136]
  - In 2021, the City of Orlando updated its municipal code to require that a percentage of new parking spaces added because of a substantial enlargement to an existing development be EV-R.
  - In 2021 the Ann Arbor City Council approved an EV parking ordinance (ORD-20-35) that required new real estate development plans to include three types of EV parking spaces: some with chargers installed, and

[132] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[133] County of Fairfax, Virginia. "Applicable Zoning Provisions for Electric Vehicle Charging Spaces." January 2021. Available at https://www.fairfaxcounty.gov/planning-development/sites/planning-development/files/assets/documents/zoning/ev-charging-stations-zoning-guidelines-1-2021.pdf.

[134] Blink Charging Company."How EV Charging Building Codes Help Future-Proof New Developments." February 2023. Available at https://blinkcharging.com/blog/how-ev-charging-building-codes-help-future-proof-new-developments.

[135] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[136] City of Seattle. An Ordinance relating to land use and zoning; amending Sections 23.22.062, 23.24.045, 5 23.49.019, 23.54.030, and 23.84A.010 of the Seattle Municipal Code; adding new requirements related to electric vehicle charging infrastructure. November 2018. Available at https://www.energy.wsu.edu/documents/EVReadinessOrdinance_Seattle_2-19.pdf.

some either EV-C or EV-R to allow easy installation of new chargers in the future.[137] While this ordinance complemented Ann Arbor's robust parking standards as defined in its Unified Development Code,[138] the Code has since been modified, eliminating the EV-R requirements and instead opting to focus on EV-I and EV-C requirements.[139] While still valuable, EV-R requirements allow for stronger futureproofing for residential, commercial, and public parking areas.

- ***Allow parking spaces with EVSE to count as at least a standard space.*** Some parking spaces with EVSE are wider to accommodate the high-powered charging equipment. Consequently, the addition of EV charging spaces to existing parking lots may reduce the total number of parking spots and violate a municipality's minimum parking requirements. To address this, states can reduce the parking minimum by the number of stalls that are "used to accommodate the charging station and its associated equipment."[140] For example:
  - In 2019, the California Legislature passed Assembly Bill 1100, which requires that an EVSE parking space counts as at least one standard parking space and that Americans with Disabilities Act (ADA) accessible EV parking spaces count as two parking spaces to comply with minimum parking requirements.[141, 142, 143]
  - In 2021, California passed AB 970[144] to expand upon AB 1236[145] by reducing the number of required parking spaces by the amount that is necessary to accommodate the EVSE and any associated equipment, such as transformers, switchboards, and power cabinets.[146, 147]
  - New Jersey's comprehensive model ordinance requires that "all parking spaces with EVSE and Make-Ready equipment shall be included in the calculation of minimum parking spaces" and "shall count as at least two parking spaces for the purpose of complying with a parking space minimum."[148]

- ***Prioritize actively charging EVs in EV-I spaces.*** Not only does this provide EV drivers the opportunity to charge, but it also signals to potential EV adopters that there are protected spaces that would be available to them should they switch to an EV. ICE drivers should be effectively discouraged from using these spaces. Repercussions, such as towing, impoundment, or citation, should be clearly indicated at multiple touch points at and around the parking spaces reserved for EVs. Additionally, EV drivers whose EVs are not actively charging should be discouraged from parking in these spaces.

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[137] City of Ann Arbor. An Ordinance to add a new Section to 5.19, Amend Sections 5.19.1, Table 5.19-1, in Section 5.19.2, Section 5.19.3, and Section 5.37.2.E, and to Add a New Section 5.19.11 of Chapter 55 (Unified Development Code) of Title V of the Code of The City of Ann Arbor (Electric Vehicle Parking) (ORD-20-35). January 2021. Available at https://a2gov.legistar.com/LegislationDetail.aspx?ID=4729268&GUID=60950F76-99C2-4667-8FCA-6AB135D2CB8B&Options=&Search=.

[138] City of Ann Arbor. Unified Development Code: Code of Ordinances, Chapter 55, 8th edition. July 2016. Amendments through February 2023. Available at https://www.a2gov.org/departments/planning/development-review/Documents/Chapter%2055%20Unified%20Development%20Code%20of%20the%20City%20Code.pdf.

[139] City of Ann Arbor. Unified Development Code: Code of Ordinances, Chapter 55, 9th edition. July 2016. Amendments through May 2024. Available at https://www.a2gov.org/departments/planning/Documents/9th%20Edition%20Unified%20Development%20Code.pdf.

[140] *Ibid.*

[141] California Legislature. California Assembly Bill 1100. October 2019. Available at https://legiscan.com/CA/text/AB1100/id/2056934.

[142] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[143] While no federal regulations exist that specify any ADA-compliant accessibility standards in relation to EVSE, in August 2023, the U.S. Access Board indicated in its Spring 2023 Unified Agenda that it planned to propose rules for EVSE accessibility (See Office of Information and Regulatory Affairs, "Accessibility Guidelines for Electric Vehicle Charging Stations"). Once these rules are proposed, there will be a period for responses before a final ruling is made. Because of current coverage by ADA compliance, several areas that may install EVSE, including state and local government offices, public parks, municipal building parking lots, state- and local-government provided housing, federal fleet depots, rest stops along the Interstate Highway System, and more, are already required to meet ADA standards (*See* United States Access Board, "Design Recommendations for Accessible Electric Vehicle Charging Stations").

[144] California Legislature. California Assembly Bill 970. "Planning and Zoning: Electric Vehicle Charging Stations." October 2021. Available at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB970.

[145] California Legislature. California Assembly Bill 1236. "Local Ordinances: Electric Vehicle Charging Stations." October 2015. Available at https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB1236.

[146] California Legislature. California Assembly Bill 970. "Planning and Zoning: Electric Vehicle Charging Stations." October 2021. Available at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB970.

[147] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[148] New Jersey Department of Community Affairs, New Jersey Department of Environmental Protection, and New Jersey Board of Public Utilities. "Charge Up Your Town: Best Management Practices to Ensure Your Town Is EV Ready." February 2022. Available at https://dep.nj.gov/wp-content/uploads/drivegreen/pdf/chargeupyourtown.pdf.

4. **Streamline the permitting process.** Experts agree that AHJs should standardize the permit review and inspection process for EVSE as much as possible.[149, 150] This can be done via legislative action, as in Colorado's HB 1173, which requires counties with a population of 20,000 or more, and municipalities with a population of 10,000 or more, to develop an EV charging permitting model code by 2026.[151]

RECOMMENDATION

Streamline the permitting process by creating model EVSE permitting processes and educating local jurisdictions.

Local leaders can also take the following steps to streamline the approval process for EV charging stations:

- Ensure the permit review and inspection process is clear and transparent. Navigating zoning ordinances should be as user-friendly as possible. An applicant needs to know what they are required to submit, where to find the application, relevant permitting steps, the associated timelines and fees, and key points of contact.[152] All-electronic applications and application materials should be provided with the requisite forms specific to the application (i.e. SFH, MFH, workplace, public, etc.). The permitting process can be divided into two phases: the application phase and the review phase. As applicants begin to pull together the required materials, it is important that they have a clear understanding of what is expected of them, the associated timeline of the review process, and any required fees to be paid. AHJs can improve the application experience by:[153]
  - Offering an online portal that clearly identifies the materials required, as well as the relevant processes, review timelines, and associated fees;
  - Providing specific landing pages for different applicant segments (SFH, MFH, workplace, public, commercial, etc.) with clear application instructions and review information for each;
  - Ensuring that all application materials can be completed electronically; and
  - Allowing materials to be submitted electronically.

- Once materials are submitted, the application moves on to review. It is common that multiple-department reviews are necessary at this stage. Questions that arise during the review period and inconsistent interpretation of codes and ordinances across AHJ departments can lead to delays in the review process. To avoid work redundancy and create efficiencies throughout the review processes, AHJs can:[154]
  - Remove zoning board approval requirements for EVSE where possible;
  - Allow for concurrent reviews of applications across multiple departments;
  - Train application reviewers and inspectors on the EVSE-codes and ordinances; and
  - Identify and train a point of contact to whom applicants can refer with questions throughout the application and review processes.

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[149] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[150] Northeast States for Coordinated Air Use Management. "Improving Permitting and Zoning for EV Fast Charging Stations: Strategies for State and Local Action." December 2023. Available at https://www.nescaum.org/documents/ev-charger-permit-and-zoning-streamlining-fs-12-05-23.pdf.

[151] Colorado Legislature. House Bill 1173. May 2024. Available at https://legiscan.com/CO/text/HB1173/2024.

[152] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

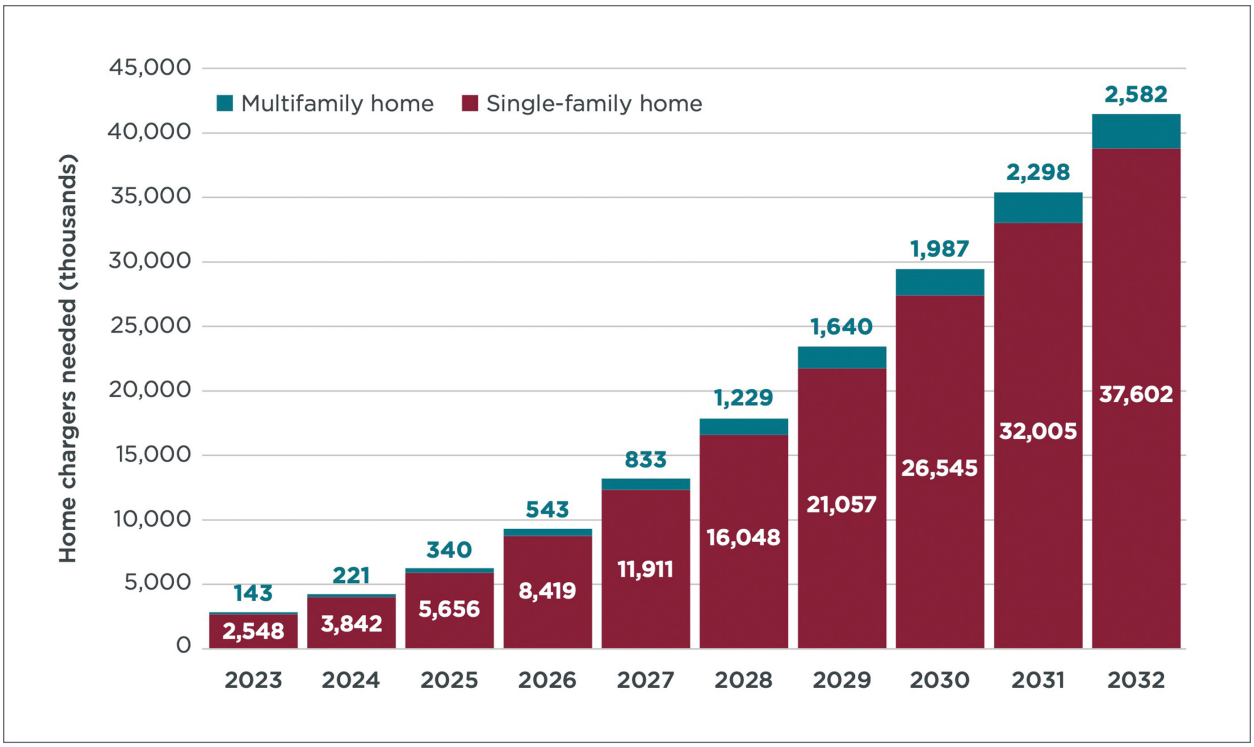
[153] *Ibid.*

[154] *Ibid.*

Section 4.2: At-Home Charging

According to a 2023 International Council on Clean Transportation (ICCT) report, the U.S. will need 40.2 million home chargers by 2032, but as of 2023 it only has 2.7 million (Figure 8).[155, 156] Due to the convenience and low cost of residential charging, typically 80% of EV charging takes place at home.[157] While opportunities to charge outside the home continue to be critical to EV deployment and continue to increase with the deployment of public charging infrastructure, it is still estimated that 68% of charging for the 33 million EVs expected to be on the road in 2030 will occur at drivers' residences.[158]

Figure 8: *Projected need for home chargers by home type across the United States, 2023 to 2032*[159]



The lower costs of at-home charging installations also have a significant impact on the anticipated costs associated with nationwide charging infrastructure. A 2023 ICCT report shows that, due to the higher costs associated with public charging infrastructure, increased access to at-home charging in both SFH and MFH settings can result in up to 20% lower costs to the total charging infrastructure network (Figure 9).[160]

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[155] Pierce, L. and P. Slowik. "Assessment of U.S. Electric Vehicle Charging Needs and Announced Deployments Through 2032." The International Council on Clean Transportation. March 2023. Available at https://theicct.org/wp-content/uploads/2024/03/ID-89-%E2%80%93-Chargers-2032_final-v2.pdf.

[156] Wood, E., *et al.* National Renewable Energy Laboratory. "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." 2023. Available at https://www.nrel.gov/docs/fy23osti/85654.pdf.

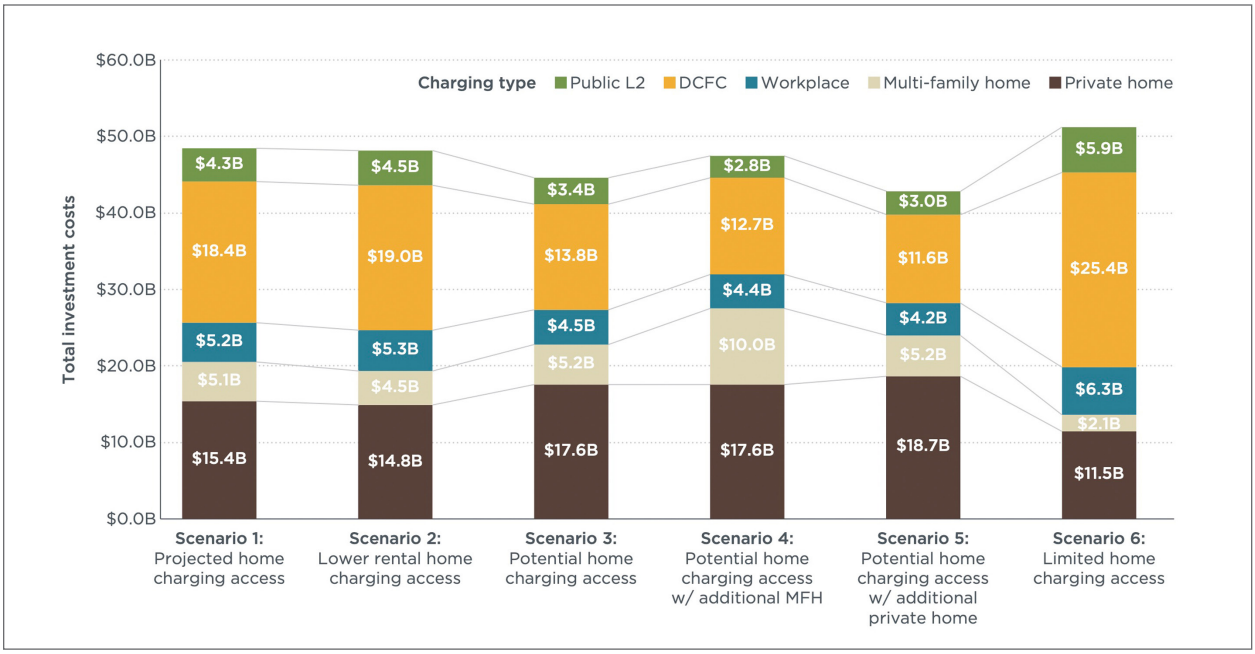
[157] Blonsky, M. *et al.* National Renewable Energy Laboratory. "Incorporating Residential Smart Electric Vehicle Charging in Home Energy Management Systems." April 2021. Available at https://www.nrel.gov/docs/fy21osti/78540.pdf.

[158] U.S. Department of Energy. Office of Energy Efficiency and Renewable Energy. "Level 1 and Level 2 EV Charging is Expected to Account for 80% of all EV Charging in 2030." March 2024. Available at https://www.energy.gov/eere/vehicles/articles/fotw-1335-march-25-2024-level-1-and-level-2-ev-charging-expected-account-80.

[159] Pierce, L. and P. Slowik. The International Council on Clean Transportation. "Assessment of U.S. Electric Vehicle Charging Needs and Announced Deployments Through 2032." March 2023. Available at https://theicct.org/wp-content/uploads/2024/03/ID-89-%E2%80%93-Chargers-2032_final-v2.pdf.

[160] *Ibid.*

Figure 9: *Cumulative charging infrastructure investment cost scenarios by charger type from 2021 - 2030*[161]



As of 2021, 74% of U.S. housing in the East North Central region, which includes Michigan, were reported to have a garage or carport, which is well above the U.S. average of 66%.[162] However, these homes do not necessarily have easy access to at-home charging due to factors such as urban density, the age of the home's construction, grid capacity, and access to a specific parking space, particularly for MFH settings. Additionally, despite the importance of at-home charging, lack of education around different EV chargers, charging speed, and cost are barriers to deploying at-home chargers and therefore, are barriers to EV adoption. In a report by JD Power, 49% of EV owners said they were unaware of the EV programs offered by their local electric utility and 18% said their utility does not offer any EV programs.[163] This section discusses the benefits and challenges of charging in different housing settings, policies and incentives available in Michigan and other states, and important considerations to effectively and equitably deploy EV chargers at residences.

Single Family Homes

A single-family home (SFH) is a property intended for one family to live in at a time and typically refers to a freestanding structure on its own piece of land, or detached from another family's property.[164] However, SFH can also refer to row homes, which may be less likely to have access to a designated parking space. EV drivers with access to charging at home frequently install Level 2 equipment in the home's garage or driveway or plug in to a standard outlet (i.e., Level 1) and most commonly charge overnight. According to a Plug In America survey, 74% of EV drivers charge their vehicles using Level 2 equipment, 20% use Level 1, and 6% use a mix of both.[165] As shown in *Table 1*, charging a vehicle with Level 1 equipment overnight is often adequate to meet the driver's travel needs the next day. For a faster charge or to fully charge the vehicle's battery overnight, EV owners can install Level 2 charging equipment.

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[161] *Ibid.*

[162] U.S. Department of Energy. Office of Energy Efficiency and Renewable Energy. "As of 2021, Two-Thirds of U.S. Housing Units Had a Garage or Carport, Improving Opportunities for EV Adoption." December 2022. Available at https://www.energy.gov/eere/vehicles/articles/fotw-1268-december-12-2022-2021-two-thirds-us-housing-units-had-garage-or.

[163] J.D. Power. "Home Charging Satisfaction a Bright Spot among Electric Vehicle Owners, J.D. Power Finds." March 2024. Available at https://www.jdpower.com/business/press-releases/2024-us-electric-vehicle-experience-evx-home-charging-study.

[164] Zinn, D. "What is a Single-Family Home?" *Forbes.* October 2022. Available at https://www.forbes.com/advisor/mortgages/real-estate/single-family-home/.

[165] O'Connor, P. *et al.* Plug In America. "2023 EV Driver Survey: A Strong Year for EVs, but Charging Reliability Needs Improvement." 2023. Available at https://pluginamerica.org/wp-content/uploads/2023/05/2023-EV-Survey-Final.pdf

Equity Considerations

EV charging equipment installation costs can increase significantly for older homes (i.e., built before 1980) often due to the need for electrical panel upgrades or the installation of load management systems to provide adequate electrical support for EV charging.[166] A study conducted by Michigan State Housing Development Authority (MSHDA), however, indicates that nearly half of all housing in Michigan was built before 1970, which is nearly double the national average.[167] Moreover, both owned (Figure 10) and rented (Figure 11) new SFH and MFH constructed after 2013 are concentrated in the suburban and exurban areas near Detroit, Lansing, Ann Arbor, Kalamazoo, and Grand Rapids,[168] all of which have median household incomes well above the statewide median.[169]

Figure 10: *Owned SFH units constructed before 1960 (left) and after 2013 (right)*[170]

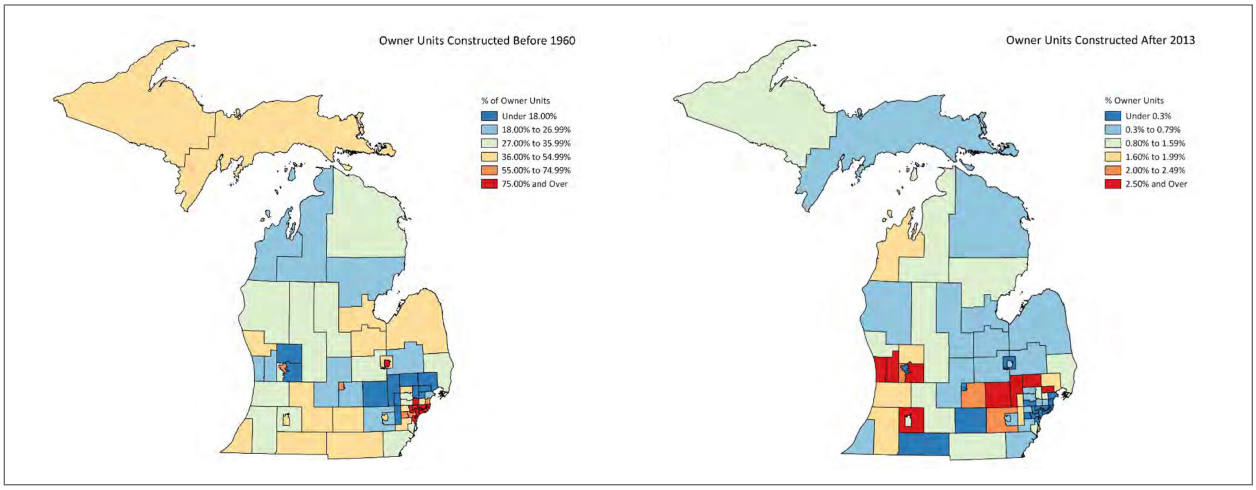
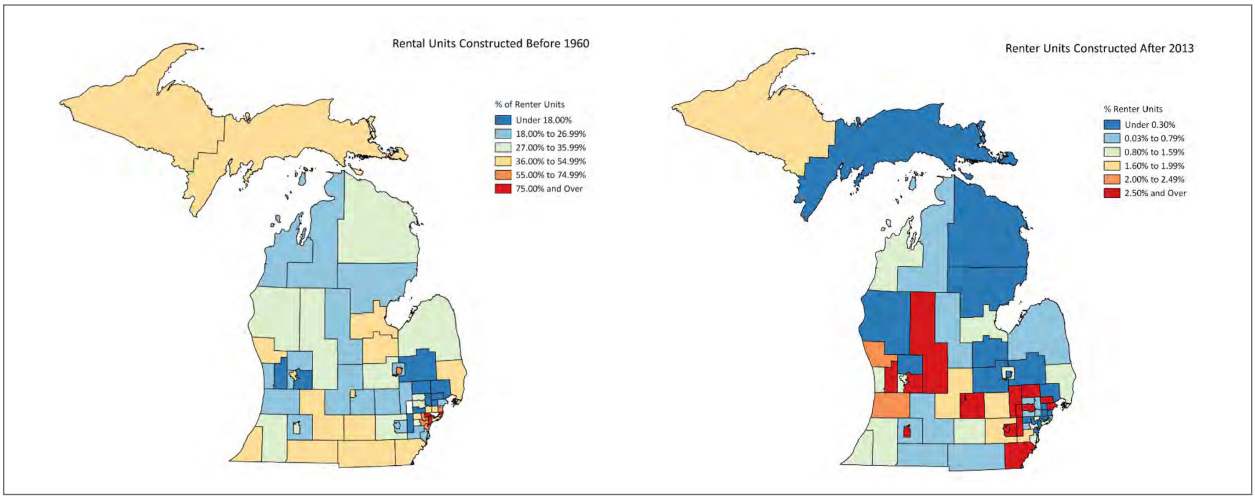


Figure 11: *Rented SFH units constructed before 1960 (left) and after 2013 (right)*[171]



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[166] Tingwall, E. "Everything You Need to Know about Charging an EV at Home: How much does it cost? How much power do you need? What's the best home EV charger? We have answers." *MotorTrend.* March 2023. Available at https://www.motortrend.com/features/home-ev-charging-installation-guide/.

[167] Allen, D. Michigan State Housing Development Authority. "Michigan Statewide Housing Needs Assessment." April 2019. Available at https://www.michigan.gov/-/media/Project/Websites/mshda/developers/Statewide-Housing-Plan/MSHDAStatewideHousingNeedsweb.pdf?rev=91271d4107a14f0695c929d9399044f4.

[168] *Ibid.*

[169] American Community Survey. "Median Household Income in Michigan Townships and Cities. 2017 – 2021." Accessed June 2024. Available at https://www.michigan.gov/leo/-/media/Project/Websites/leo/Documents/MCSC/MCDA_Community_MedianHouseholdIncome_2017-2021.pdf?rev=a0b0acfa7a0e47c795b3ad7faea61758&hash=D078B8825BC4DE676E881D51CE8EA546.

[170] Allen, D. Michigan State Housing Development Authority. "Michigan Statewide Housing Needs Assessment." April 2019. Available at https://www.michigan.gov/-/media/Project/Websites/mshda/developers/Statewide-Housing-Plan/MSHDAStatewideHousingNeedsweb.pdf?rev=91271d4107a14f0695c929d9399044f4.

[171] *Ibid.*

At best, the age of the housing stock creates an inconvenience and increases the payback period for the purchase of an EV and EVSE. At worst, these issues discourage EV adoption, especially for LI families. In addition to the cost prohibitive nature of current EV models on the market, LI families also face more challenges to charging EVs at home (e.g., lack of control for renters, or more costly upgrades for older homes), underscoring equity concerns.

Existing Federal and Utility Incentive Programs

To offset these costs, several federal and utility incentives exist that can help Michigan residents afford installation of EVSE at their homes (Table 4).

RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

RECOMMENDATION

Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.

Programs like these alleviate some of the financial burden associated with installing EVSE, thereby enabling EV adoption. Assuming the customer is installing a Wi-Fi connected Level 2 charger, which is a stipulation for most of the utility rebates detailed in Table 4, incentive programs like this also encourage shifts in customer behavior to charge during off-peak hours, providing the customer with additional cost savings and mitigating concerns over grid capacity constraints (see Section 6.4 for more details).

Table 4: Federal and utility incentives for SFH residents

Administrator	Program	Details
U.S. Treasury	Alternative Fuel Vehicle Refueling Property Credit	For consumers who purchase and install qualified alternative fuel vehicle refueling property for their principal residence, including electric vehicle charging equipment, between December 31, 2022 and January 1, 2033, there is a federal income tax credit equal to 30% of the total cost with a maximum amount of $1,000 per item.[172] Eligibility is based on the installation location being in an eligible LI census tract, which can be reviewed using the 30C Tax Credit Eligibility Locator Mapping Tool[173] developed by Argonne National Laboratory.[174]
Consumers Energy	PowerMIDrive	Through its "PowerMIDrive" program,[175] Consumers Energy customers who own an EV can qualify for a $500 rebate for installing a Level 2 charger with a maximum output of 9.6 kW that is both ENERGY STAR and UL-certified or provided by an automotive manufacturer. Income qualified customers may be eligible to receive up to $1,000. Qualifying for this rebate will automatically enroll the customer in the Smart Charging Incentive Program, which incentivizes the customer to charge during off-peak hours during 11pm and 6am during weekdays and anytime during weekends. In return, the customer receives $10 per month per EV for 12 months. Customers that already have their own charger or that do not qualify for the Level 2 rebate can also enroll in the Smart Charging Incentive Program.
DTE Energy	Charging Forward	Through its "Charging Forward" program,[176] DTE Energy customers who own an EV can currently qualify for a $500 rebate for installing a Wi-Fi connected Level 2 charger with a maximum output of 12 kW that is ENERGY STAR certified or provided by an automotive manufacturer. Income qualified customers may be eligible to receive up to $1,500.[177] Customers who receive a rebate are required to enroll in an EV Time-of-Use (TOU) rate.
Holland Board of Public Works	Residential Electric Vehicle Charger Rebate	Through its "Residential EV Charger Rebate" program,[178] HPBA customers can qualify for a $325 rebate with the installation of a 240V ENERGY STAR certified Level 2 charger. If the charger is a 240V Level 2 device, but is not ENERGY STAR certified, the customer is eligible for a $300 rebate. Those customers provided a rebate must agree to participate in the HPBWs Electric Vehicle Whole House TOU rate.
Indiana Michigan Power (I&M)	Charge at Home in Michigan	Through I&M's "Charge at Home in Michigan" program,[179] I&M customers who own an EV can qualify for a $500 rebate for installing a Level 2 charger that meets all local permitting and applicable building inspection requirements. After inspection and the installation of a submeter, the customer is eligible to participate in the off-peak EV rate, which discounts the residential per kWh rate by 45% for EV charging between 11pm and 6am.
Lansing Board of Water & Light (BWL)	Residential EV Charging Incentive Program	Through its "Residential EV Charging Incentive Program",[180] BWL customers can choose from two rebates to help offset the costs associated with the installation of home charging stations: • The Second Meter Installation Rebate is a rebate of up to $1,000 if the customer chooses to install EVSE that is going to be hardwired and wishes to install a second meter to track EV charging separately.[181] • The PEV Off-Peak Savers Rebate is a rebate of up to $500.[182] This rebate is a better fit if the customer wants to install EVSE that is portable and to optimize home energy consumption by enrolling in a TOU rate.

[172] Internal Revenue Service. "Alternative Fuel Vehicle Refueling Property Credit." May 2024. Available at https://www.irs.gov/credits-deductions/alternative-fuel-vehicle-refueling-property-credit#:~:text=For%20consumers%20who%20purchase%20and,amount%20of%20%241%2C000%20per%20item.

[173] U.S. Department of Energy. "30C Tax Credit Eligibility." Accessed June 2024. Available at https://experience.arcgis.com/experience/3f67d5e82dc64d1589714d5499196d4f/page/Page/.

[174] Argonne National Laboratory. "Refueling Infrastructure Tax Credit." Accessed June 2024. Available at https://www.anl.gov/esia/refueling-infrastructure-tax-credit.

[175] Consumers Energy. "PowerMIDrive Rebates." Accessed June 2024. Available at https://www.consumersenergy.com/residential/programs-and-services/electric-vehicles/powermidrive?utm_campaign=powermidrive&utm_source=powermidrive&utm_medium=vanity-url&utm_content=powermidrive.

[176] DTE Energy. "Home EV Charger Rebate." Accessed June 2024. Available at https://www.dteenergy.com/us/en/residential/service-request/pev/home-ev-charger-rebate.html.

[177] DTE Energy. "Electric Vehicle Rebate Agreement." April 2024. Available at https://www.dteenergy.com/content/dam/dteenergy/deg/website/residential/electric/pev/EV-Rebate-Agreement-Rev-2-2.pdf.

[178] Holland Board of Public Works. "Residential Electric Vehicle Charger Rebate Application." Accessed June 2024. Available at https://www.hollandbpw.com/en/customer-service/rebates/forms/rebates/95-rebate-application-residential-ev-charger/file.

[179] Indiana Michigan Power. "Charge at Home in Michigan." Accessed June 2024. Available at https://www.indianamichiganpower.com/clean-energy/electric-cars/charge-at-home-michigan.

[180] Lansing Board of Water & Light. "Plug-In Electric Vehicles (PEV)." Accessed June 2024. Available at https://www.lbwl.com/customers/save-money-energy/plug-electric-vehicles-pev.

[181] Lansing Board of Water & Light. "Second Meter Installation - $1,000 Rebate." Accessed June 2024. Available at https://www.lbwl.com/second-meter-installation-1000-rebate.

[182] Lansing Board of Water & Light. "PEV Off-Peak Savers Program - ($500 Rebate)." Accessed June 2024. Available at https://www.lbwl.com/pev-off-peak-savers-program-500-rebate.

Communication and Education Opportunities

As noted above, however, an estimated 49% of EV owners do not know about the utility programs available to them.[183] There are several touchpoints that can educate potential EV owners about the available offers:

- ***Utility Engagement:*** Utilities are ideal partners to educate the public about the benefits of EVs, the appropriate charging infrastructure, and program offerings.[184] With easily navigable sites that clearly point customers to the appropriate resources, and teams dedicated to assisting customers, utilities can ensure a more seamless customer experience. Many Michigan utilities also offer "Ride and Drive" events, which provide customers with opportunities to test drive and learn more about EVs.
- ***Local Units of Government:*** As previously discussed, local governments are also important points of contact for consumers who are considering purchasing an EV or who already have one. Having printed and online materials available for residents can help them better understand where chargers are located in their community and inform them of the incentives available to them. This information should be easy to find and displayed clearly for all residents by use type (residential or commercial) and by housing type (SFH, MFH, townhome, etc.).
- ***Automotive Dealerships:*** Historically, car buyers relied heavily on the expertise at automotive dealerships for information about prospective vehicles. Today, however, nearly 40% of dealers offer consumers the ability to complete all steps of the purchasing process online.[185] Despite this shift, given the nascence of EV development and consumers' familiarity with EVs, 93% of customers feel that test drives and dealership engagement remain important steps in considering the purchase of an EV.[186] As described in more detail in *Section 3.2*, to effectively inform the EV-curious customer and serve the growing EV market, it is, therefore, incredibly important that used and new automotive dealerships and their sales personnel are well educated on the programs and incentives available for home EVSE installation.

It is also important to note that the share of renters living in SFH in Michigan increased by 12.5% between 2011 and 2021.[187] Educating property owners regarding the benefits of EV charging, as discussed in more detail below, is a persistent challenge. Other states have addressed this issue by passing what has come to be known as "Right to Charge" legislation (see *Resident Rights* for more detail).[188, 189, 190, 191, 192, 193] In Michigan, the Homeowners' Energy Policy Act, signed into law by Governor Whitmer in July 2024, makes homeowners association (HOA) agreements that prohibit EVSE, as well as other energy-related technologies, invalid and unenforceable.[194] The Act also does not allow HOAs to require approval for installation of EVSE or any related maintenance and ensures that HOA members are able to make any necessary auxiliary changes needed for the installation of EVSE.[195]

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[183] J.D. Power. "Home Charging Satisfaction a Bright Spot among Electric Vehicle Owners, J.D. Power Finds." March 2024. Available at https://www.jdpower.com/business/press-releases/2024-us-electric-vehicle-experience-evx-home-charging-study.

[184] Huether, P. *et al.* American Council for an Energy-Efficient Economy. "Utility Transportation Electrification Planning - Emerging Practices to Support EV Deployment." September 2022. Available at https://www.aceee.org/research-report/t2201.

[185] Hickey, J. "Digital Retailing Continues to Grow at Auto Dealerships." *Digital Dealer.* November 2023. Available at https://digitaldealer.com/data-analytics/digital-retailing-continues-to-grow-at-auto-dealerships/.

[186] Electrification Coalition. "EVs and Consumer Choice." Accessed June 2024. Available at https://electrificationcoalition.org/work/state-ev-policy/evs-and-consumer-choice/#:~:text=93%20percent%20of%20customers%20polled,the%20full%20car%20purchasing%20experience.

[187] State of Michigan. "State of Michigan Housing Data Portal." Accessed June 2024. Available at https://mihousingdata.org/?tab=supply.

[188] Illinois Legislature. Illinois 765 ILCS 1085. "Electric Vehicle Charging Act." July 2023. Available at https://ilga.gov/legislation/ILCS/ilcs3.asp?ActID=4407&ChapterID=62.

[189] Colorado Legislature. Colorado House Bill 23-1233. May 2023. Available at https://leg.colorado.gov/sites/default/files/2023a_1233_signed.pdf.

[190] Maryland Legislature. Maryland Article - Real Property: Section 11-111.4. Accessed June 2024. Available at https://mgaleg.maryland.gov/mgawebsite/Laws/StatuteText?article=grp&section=11-111.4&enactments=False&archived=False.

[191] New Jersey Legislature. New Jersey Public Law 1993. October 2020. Available at https://pub.njleg.state.nj.us/Bills/2020/PL20/108_.PDF.

[192] Florida Legislature. Florida Statute 718.113, Section 3, Subsection 8. 2023. Available at http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0700-0799/0718/Sections/0718.113.html.

[193] Plug In America. "Right to Charge Policies." Accessed June 2024. Available at https://pluginamerica.org/policy/right-to-charge-policies/.

[194] Michigan Legislature. Public Act 98. July 2024. Available at https://www.legislature.mi.gov/documents/2023-2024/publicact/pdf/2024-PA-0068.pdf.

[195] *Ibid.*

Residential Building Codes

In addition to enabling EVSE in existing homes, a key part of expanding access to charging in future homes, both SFH and MFH, is to build them to be ready for EV charging adoption. As described in *Section 4.1*, states and jurisdictions can adopt EV-C or EV-R parking spaces in their residential building codes, which include requirements for residential buildings and multi-family dwellings three stories or less in height.

In addition, as discussed in *Section 3.1*, EV readiness requirements in energy codes decrease overall costs to install chargers in new homes at a later date. Making homes EV-R at the time of construction can save customers, on average, up to $1600 in retrofit costs, if they choose to install a charger at a later time.[196] Therefore, it is more cost-effective to ensure a residential building is EV ready when it is being built or undergoing major renovations than to conduct these electrical upgrades when a charger is later installed.

Multifamily Housing

MFH properties are multiple separate homes that are contained within the same building or a complex of buildings, like an apartment, condo building, cooperative, mobile home park, or townhouse.[197] Today, about one million homes, or 23% of the housing stock, in Michigan are in MFH of five or more units.[198] According to the U.S. DOE, property owners can attract and retain residents by offering EV charging.[199] A market scan by the Joint Office of Energy and Transportation, however, indicates that only 5% of at-home charging takes place in the MFH setting.[200] MFH properties have unique challenges that make it harder to charge at home. As discussed in more detail below, access to parking, grid capacity, coordination with the property owners, and the age of the building can affect whether a MFH resident can charge an EV at home. According to one study, these hurdles, coupled with barriers to entry due to higher upfront costs, have made it more challenging for renters to adopt EVs, with homeowners being three times more likely to own an EV than renters.[201] As of June 2023, 28% of Michigan's households were renters.[202] In the U.S., 52% of renters live in an apartment.[203] Figure 12 shows that much of the non-SFH housing stock in Michigan is renter occupied.

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[196] Alliance to Save Energy. "These New Building Codes Could Finally Ensure New Houses are Ready for Charging Electric Vehicles." January 2020. Available at https://www.ase.org/blog/these-new-building-codes-could-finally-ensure-new-houses-are-ready-charging-electric-vehicles.

[197] Smart Columbus. "Smart Columbus Kickstarts EV Charging Deployments at Multi-Unit Dwellings: Case Study on Multi-Unit Dwelling Charging Infrastructure." 2018. Available at https://d2rfd3nxvhnf29.cloudfront.net/legacy/uploadedfiles/playbook-assets/electric-vehicle-charging/mud-case-study-final.pdf.

[198] Michigan Municipal League. "State of Michigan Housing Data Portal." Accessed June 2024. Available at https://mihousingdata.org/about.

[199] U.S. Department of Energy. Alternative Fuels Data Center. "Electric Vehicles for Multifamily Housing." Accessed June 2024. Available at https://afdc.energy.gov/fuels/electricity-charging-multi.

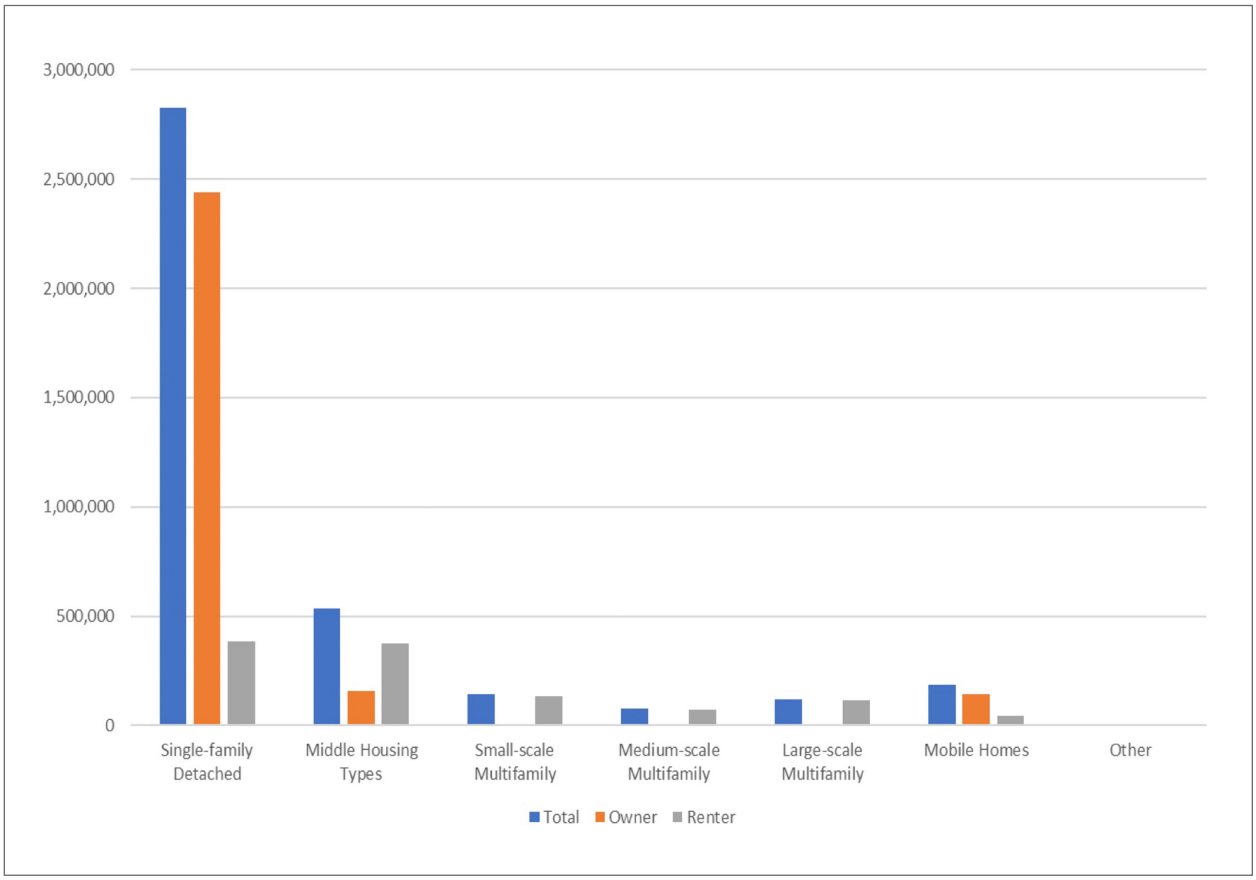
[200] Joint Office of Energy and Transportation. "Electric Vehicle Charging Solutions for Multifamily Housing Market Scan." April 2023. Available at https://driveelectric.gov/files/webinar-2023-04-25-community-charging-market-scan.pdf.

[201] Davis, L. "Evidence of a Homeowner-renter Gap for Electric Vehicles." *Applied Economics Letters.* 2019. 26:aa, pp. 927-932. Available at https://faculty.haas.berkeley.edu/ldavis/Davis%20AEL%202019%20Gap.pdf.

[202] Hicks, J. and S. Levin. "Where Rent is Most, Least Affordable in Michigan." *MLive.* June 2023. Available at https://www.mlive.com/public-interest/2023/06/where-rent-is-most-least-affordable-in-michigan.html#:~:text=Michigan%20rental%20affordability%20by%20county,-Can't%20see&text=As%20a%20state%2C%20about%2028,42%25%20and%2039%25%20respectively.

[203] Kilroy, A. "Renting Statistics 2024." *Forbes.* February 2024. Available at https://www.forbes.com/advisor/renters-insurance/renting-statistics/#sources.

Figure 12: *Owner and renter-occupied housing stock by housing type in Michigan*[204]



In its 2024 TEP, DTE Energy indicated that only 250 Business Charger Rebates had been approved for MFH, compared to 4,400 rebates for SFH, which means that only 6% of the approved rebates for home chargers were provided to MFH residents, despite estimates that 20% of customers live in MFH properties.[205] This highlights an opportunity for improved communication, education, and programs for property managers and renters alike.

Equity Considerations

Income among renters, including those living in MFH, is also typically much lower than that of homeowners. In fact, Michigan's median household incomes for homeowners and renters are $80,000 and $39,000 respectively, marking a nearly 52% disparity.[206] Racial disparities are also stark among these two populations. In 2022, Black Michigan residents accounted for the only race or ethnic category that had a higher home rentership (55%) than ownership (45%) rate.[207] Comparatively, only 21% of Michigan's white residents rent, and 79% own a home.[208] Given these differences, it is apparent that the White population in Michigan has greater access to homeownership benefits, including at-home EV charging, than the state's

[204] Allen, D. Michigan State Housing Development Authority. "Michigan Statewide Housing Needs Assessment." April 2019. Available at https://www.michigan.gov/-/media/Project/Websites/mshda/developers/Statewide-Housing-Plan/MSHDAStatewideHousingNeedsweb.pdf?rev=91271d4107a14f0695c929d9399044f4.

[205] DTE Energy. Case No. U-21538. "DTE Energy Company's Transportation Electrification Plan." January 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000BUT09AAH.

[206] Belhaj, M., *et al.* Michigan State Housing Development Authority. "Michigan Statewide Housing Needs Assessment." 2024. Available at https://www.urbanh3.com/_files/ugd/9d463d_02fdfe4f619f4adf885a96677c710479.pdf.

[207] *Ibid.*

[208] *Ibid.*

minority communities.[209] Like SFH, many MFH properties in more densely populated urban areas are older, thus making it more difficult and expensive to perform retrofits to allow EV charging. These discrepancies not only point to an alarming concern over racial inequity in the housing market, but also to clear inequities in EV charging access.

Unique Challenges in the MFH Setting

Though much of the current policy focus is on existing MFH stock, to further complicate matters, Michigan, and many other states, is facing a housing shortage problem. Economic and job growth in Michigan has outpaced new housing development more than 2 to 1.[210] Since 2014, multifamily units on average have comprised about 27% of all new construction in Michigan.[211] According to a study by MSHDA and the University of Michigan, 30% of the total construction permits awarded in 2022 were for MFH structures.[212] For new construction, ensuring that MFH property owners are required to make all residential parking spaces EV-R for Level 2 chargers will greatly lower the life-cycle cost for future charger installations (See *Section 4.1* for more details).[213] As new housing is built to meet the demands of new and existing residents, measures like these and updates to the residential (discussed in *Section 3.1*) and commercial building codes (discussed below) are important to ensuring that new housing can support the increasing EV adoption.

MFH property owners interested in installing EVSE face several dilemmas. First, it may be daunting to know where to look and who to turn to for resources (e.g., information about choosing the right chargers for the tenants' needs, understanding the building's electrical capacity, deciding between business models, etc.). Just as the need for financial assistance remains a critical barrier for property owners to provide EVSE installations to their residents, so too is the application for funding, particularly from federal and state programs. Utilities, municipalities, and state agencies must continue to engage with property owners to bridge these gaps. For example, as discussed in more detail below, part of the EPA's Clean School Bus program assists school districts in applying for grants for clean school buses and charging infrastructure. MFH property owners often need similar assistance to apply for federal and state funding. Technical and planning assistance can be provided through some rebate programs, such as the British Columbia Hydro and Power Authority's EV Ready Rebate Program and the Oregon Department of Transportation's Community Charging Rebates Program, as discussed below. An expansion of the support provided by the MI Funding Hub could perform a similar function.[214] In addition, several EVSPs offer information about funding opportunities available to MFH property owners and residents. These companies often help apply for funding and navigate the zoning and permitting process. Leveraging EVSP expertise to apply for financial incentives and navigating zoning and permitting requirements can improve a property owner's chances of receiving funding and project approval.

Second, installation and equipment costs for EVSE at MFH buildings can be high, representing a significant obstacle to property owners looking to provide EVSE to their residents. While commercial-grade Level 2 charging stations can typically cost between $1,000 to $2,000 per charging port, the total cost can often range between $5,000 to $10,000, or more,[215] due to variables like equipment costs, labor costs, network costs, permitting fees, and costs from electrical system and utility-side grid upgrades. Property owners are thus often faced with the decision to upgrade an entire parking area at one time, upgrade small sections of parking over time, or abandon the project altogether. As shown in Figure 13, comprehensive investments that make ready all MFH parking, or comprehensive futureproofing, can significantly reduce life cycle costs than a more unplanned, piecemeal approach.

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[209] *Ibid.*

[210] Michigan Municipal League. "State of Michigan Housing Data Portal." Accessed June 2024. Available at https://mihousingdata.org/about.

[211] Allen, D. Michigan State Housing Development Authority. "Michigan Statewide Housing Needs Assessment." April 2019. Available at https://www.michigan.gov/-/media/Project/Websites/mshda/developers/Statewide-Housing-Plan/MSHDAStatewideHousingNeedsweb.pdf?rev=91271d4107a14f0695c929d9399044f4.

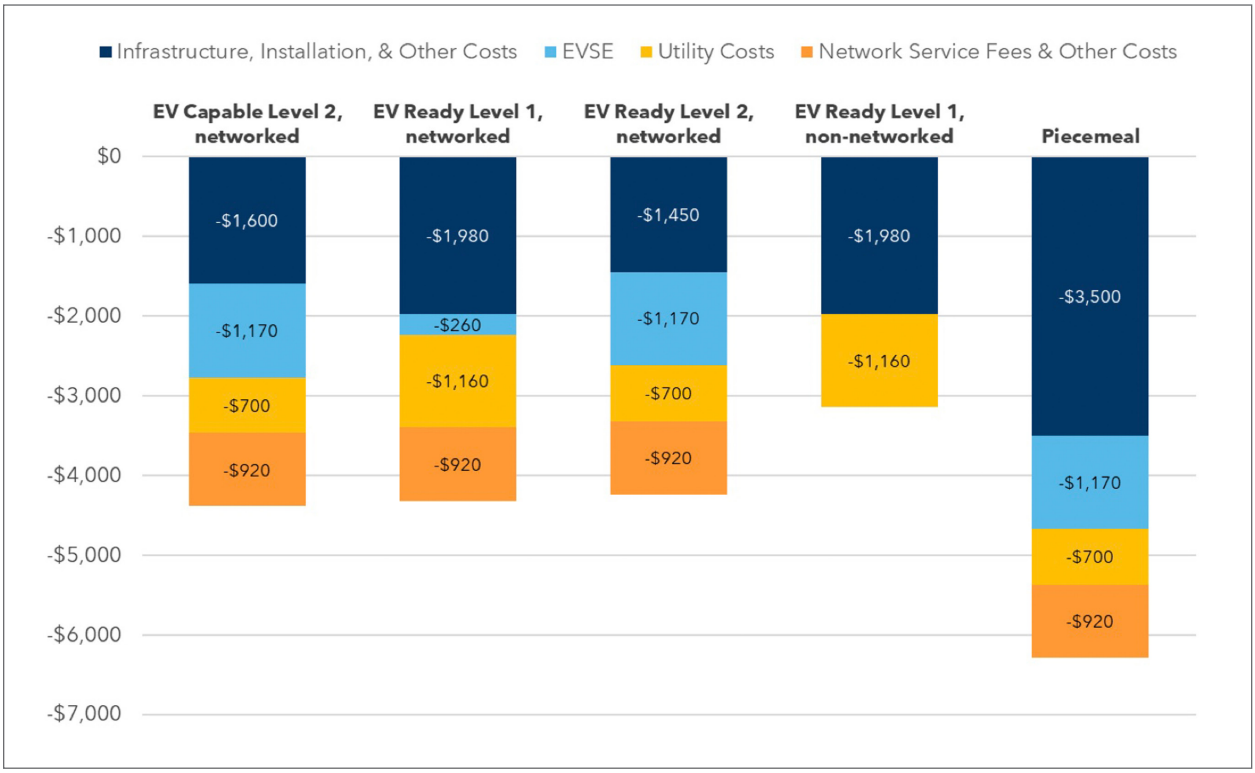
[212] Belhaj, M., *et al.* Michigan State Housing Development Authority. "Michigan Statewide Housing Needs Assessment." 2024. Available at https://www.urbanh3.com/_files/ugd/9d463d_02fdfe4f619f4adf885a96677c710479.pdf.

[213] Dunsky Energy and Climate Advisors. "Futureproofing Multifamily Buildings for EV Charging." 2024. Available at https://media.fcm.ca/sites/GMF/resources/Report/futureproofing-multifamily-buildings-for-ev-charging.pdf.

[214] Michigan Municipal League. "MI Funding Hub." 2024. Available at https://mifundinghub.org/.

[215] Smart Columbus. "Smart Columbus Kickstarts EV Charging Deployments at Multi-Unit Dwellings: Case Study on Multi-Unit Dwelling Charging Infrastructure." 2018. Available at https://d2rfd3nxvhnf29.cloudfront.net/legacy/uploadedfiles/playbook-assets/electric-vehicle-charging/mud-case-study-final.pdf.

Figure 13: Net present cost of different futureproofing configurations, assuming a 7% discount rate on future cash flows[216]



Lack of charging access is a primary obstacle that prevents many MFH households from switching to an EV. This obstacle can often be partly alleviated by deploying publicly accessible chargers in proximity to MFH properties. However, charging access alone is often insufficient because such public charging is generally less affordable. Charging at home is generally the least expensive way to charge, for two key reasons. One reason is that drivers who charge at publicly available stations that dispense electricity as a commodity often pay surcharges and other fees on top of the per-kWh retail cost of the electricity. Another reason is that at-home charging often allows for charging at a significantly discounted rate when charging during off-peak times. Because renters and LI households comprise a disproportionately higher share of MFH dwellers compared to the rest of Michigan's population, this lack of on-site MFH charging contributes to a growing economic disparity: higher-income SFH households that can charge at home enjoy the economic savings of driving electric, while MFH households – even if they have access to nearby charging – do not generally benefit from less expensive at-home charging.

Existing Utility Incentives in Michigan

MFH EV charger installations are often far more expensive than a SFH charger installation. Financial incentives to alleviate this burden are a necessary enabler for many property owners to pursue projects. Given the financial and logistical challenges, coordination with local utilities is essential, and many offer programs specifically designed for MFH. Examples of financial incentives currently offered by some of Michigan's utilities are shown in Table 5.

[216] Dunsky Energy and Climate Advisors. "Futureproofing Multifamily Buildings for EV Charging." 2024. Available at https://media.fcm.ca/sites/GMF/resources/Report/futureproofing-multifamily-buildings-for-ev-charging.pdf.

Table 5: Examples of Michigan utility incentives for MFH property owners

Administrator	Program	Details
Consumers Energy	PowerMIDrive	Multifamily property owners are eligible for up to $7,500 for installing a minimum of two Level 2 charging ports on 100 amps of service. Separate metering is required on the commercial TOU rate to encourage off-peak charging.[217] For the first year in operation, if at least 80% of charging takes place off-peak, the property owner will receive a $20/month bill credit.[218] Property owners can apply for multiple rebates, as well as choose the appropriate pricing structure for tenants.[219]
DTE Energy	Business Charger Rebate	MFH property owners are also eligible for DTE's commercial rebates.[220] Applicants are eligible for $2,000 per Level 2 station, and up to $14,400 in assistance.[221, 222]
I&M	Multi-Unit Dwelling Incentives	MFH applicants are eligible for a charger rebate. I&M will pay $2,500 for the first port and $500 for each port thereafter.[223] Based on anticipated revenue, I&M can waive upgrade investment costs associated with adding new service.[224]

RECOMMENDATION

Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.

Other Existing Incentives

In addition to incentives offered by utilities, local units of government and property owners can also apply for a number of federal resources including, for example:

- ***Charging and Fueling Infrastructure Discretionary Grant Program:*** This competitive grant program is managed by the U.S. Department of Transportation's Federal Highway Administration (FHWA; see *Charging and Fueling Infrastructure Discretionary Grant Program* for more details).[225] A variety of stakeholders can apply individually or competitively. For

[217] Consumers Energy. "Multifamily Property EV Charger Rebate." Accessed June 2024. Available at https://www.consumersenergy.com/business/products-and-services/electric-vehicle-support-for-business/multifamily-property-ev-charger-rebate.

[218] *Ibid.*

[219] *Ibid.*

[220] DTE Energy. "Multi-Unit Dwelling." Accessed June 2024. Available at https://www.dteenergy.com/us/en/business/service-request/pev/pev-biz-multi-unit.html.

[221] DTE Energy. "Business EV Charger Rebate." Accessed June 2024. Available at https://www.dteenergy.com/us/en/business/service-request/pev/pev-biz-charge-frwd.html.

[222] DTE Energy. Case No. U-21538. "DTE Energy Company's Transportation Electrification Plan." January 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000BUT09AAH.

[223] Indiana & Michigan Power. "Charge at Work in Michigan." Accessed June 2024. Available at https://www.indianamichiganpower.com/clean-energy/electric-cars/business/charge-at-work-michigan.

[224] *Ibid.*

[225] U.S. Department of Transportation. "Charging and Fueling Infrastructure Grant Program." Accessed June 2024. Available at https://www.transportation.gov/rural/grant-toolkit/charging-and-fueling-infrastructure-grant-program.

example, the New Jersey Department of Environmental Protection was awarded $10 million to expand access to EV charging for residents of MFH properties in low- and moderate- income neighborhoods.[226]

- ***Alternative Fuel Vehicle Refueling Property Credit (30C):*** A MFH building owner or developer installing qualifying alternative fuel vehicle refueling property and meeting prevailing wage and apprenticeship requirements may be eligible for a 30% tax credit, up to $100,000 for each item of refueling property.[227] This tax credit, established by the Inflation Reduction Act (IRA), is stackable with other tax credits, such as the New Energy Efficient Home Credit (Section 45L), Energy Efficient Commercial Buildings Deduction (Section 179D), Energy Credit (Section 48), and Low-Income Communities Bonus Credit Program (48(e)), as well as state rebates.

- ***U.S. Smart City Challenge:*** In 2016, the U.S. Smart City Challenge grant awarded the City of Columbus up to $40 million to reshape its transportation system.[228] Prior to this award, Columbus had already raised $90 million from local and private business partners to supplement the Smart Cities Grant.[229] The Smart Columbus initiative released applications for a MFH EV charging infrastructure program in mid-2017 and approved 11 sites supporting the installation of 48 Level 2 charging ports for a total cost of $167,998.[230] This program supplemented installations by the local utility, American Electric Power. In addition to financial incentives, the initiative also identified opportunities to update local building code requirements, develop education and outreach material for both EV owners and MFH property owners, and engage with the local utility to encourage collaboration.

- ***Oregon Department of Transportation's Community Charging Rebates Program:*** This program is part of a $100 million commitment to accelerate EV charging deployment along Oregon's roads and within its communities over the next five years.[231] Up to $7 million is intended to support the installation of Level 2 charging stations at strategic locations, particularly in public, workplace, and MFH sites. Funding is distributed on a first-come, first-serve basis with a minimum of 70% of funding being invested in projects within rural and disadvantaged communities. MFH projects for EV charging where charging is accessible to all residents are eligible for $5,500 for Level 2 charging, or up to 75% of project costs, and $750 for Level 1 charging. In addition to rebates, the program also offers technical assistance to help applicants navigate the application process from beginning to end.

- ***British Columbia Hydro and Power Authority program:*** This Canadian electric utility offers EV-R rebates to apartment, condo, and townhome complexes. The rebate program has three tracks that applicants can submit for one at a time or together.[232]
  - The EV-R plan rebate covers up to 75% of the costs, maximum CA$3,000, for the creation of an EV Ready plan, which will outline a strategy to make at least one parking space per residence EV-R.
  - The EV-R infrastructure rebate covers up to 50% of costs to install the electrical infrastructure required to implement the EV-R plan, to a maximum of CA$600 per parking space or CA$120,000.
  - The EV charger rebate covers up to 50% of the costs, or up to CA$1,400 per Level 2 installation, to a maximum of CA$14,000.

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[226] U.S. Department of Transportation. Federal Highway Administration. "Charging and Fueling Infrastructure Program Grant Recipients: FY 2022 and 2023 Grand Award Recipients." Accessed June 2024.

[227] U.S. Department of the Treasury. "The Inflation Reduction Act: Benefits for Builders of Multifamily Housing." October 2023. Available at https://home.treasury.gov/news/featured-stories/the-inflation-reduction-act-benefits-for-builders-of-multifamily-housing.

[228] U.S. Department of Transportation. "U.S. Department of Transportation Announces Columbus as Winner of Unprecedented $40 Million Smart City Challenge." June 2016. Available at https://www.transportation.gov/briefing-room/us-department-transportation-announces-columbus-winner-unprecedented-40-million-smart.

[229] Knox, T. "Public-private Partnership Propelled Columbus' Smart City Win." *Columbus Business First.* April 2015. Available at https://www.bizjournals.com/columbus/news/2016/06/22/public-private-partnership-propelled-columbus.html.

[230] Smart Columbus. "Smart Columbus Kickstarts EV Charging Deployments at Multi-Unit Dwellings: Case Study on Multi-Unit Dwelling Charging Infrastructure." 2018. Available at https://d2rfd3nxvhnf29.cloudfront.net/legacy/uploadedfiles/playbook-assets/electric-vehicle-charging/mud-case-study-final.pdf.

[231] Oregon Department of Transportation. State of Oregon Climate Office. "ODOT's Community Charging Rebates Program." Accessed June 2024. Available at https://www.oregon.gov/odot/climate/Pages/communitychargingrebates.aspx.

[232] British Columbia Hydro and Power Authority. "B.C.'s EV Charger Rebate Program." Accessed June 2024. Available at https://electricvehicles.bchydro.com/incentives/charger-rebates#Apartment,%20condo%20and%20townhome%20complexes.

By applying to all of the programs together, property owners can streamline EV-related upgrades, enabling more comprehensive futureproofing. If completed together, MFH properties are eligible for up to CA$137,000. Applicants are also able to receive up to five hours of free advice and planning assistance from an EVSE expert to help property owners better understand their charging needs.[233] Rebates can be combined with other incentives, but will be capped so total incentives do not exceed the total cost of the equipment and installation. In addition to the rebate program, MFH property owners can also receive funds from some local BC cities and districts. For example, with a contribution of $2,000, property owners can receive up to CA$93,000 to have city-owned EV chargers installed in their buildings through the Rental Building EV Ready Top-up Program.[234] Similarly, the District of Saanich's EV Charging in Existing Multifamily Buildings Top-Up Rebates provide up to CA$1,000 for the development of an EV-Ready Plan and up to CA$100 per parking stall for EV-R infrastructure.[235]

Not all funding programs are well suited to the MFH sector, however. One challenge associated with federal incentive programs in particular is often a requirement that chargers be publicly accessible. As a result, many MFH properties are ineligible for this funding because of a lack the available space to install publicly accessible chargers, or safety, liability, and insurance-related concerns. It therefore becomes even more imperative not only for continued utility incentives but for the state, its departments, and local governments to also explore a variety of ways in which to support MFH property owners and their renters.

RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications

Effective incentive programs specifically address challenges encountered by MFH property owners. In developing incentives for different underserved customer segments, the state, its agencies, and local municipalities should endeavor to cater incentive programs to the applicant. In Michigan, several of Michigan's electric utilities have developed pilot programs specifically aimed at deploying charging in the MFH setting (*Table 5*). Regardless of the administrator, rebates offered should allow for room for adoption across multiple customer segments (including MFH buildings with both low- and middle-income residents) to ensure use of the funding that has been allocated to those programs. Regardless of where funding comes from, property owners with a better understanding of the costs associated with charging installations and the charging needs of the residents in their buildings can better establish an appropriate business model.

Charging Layout by Parking Structure

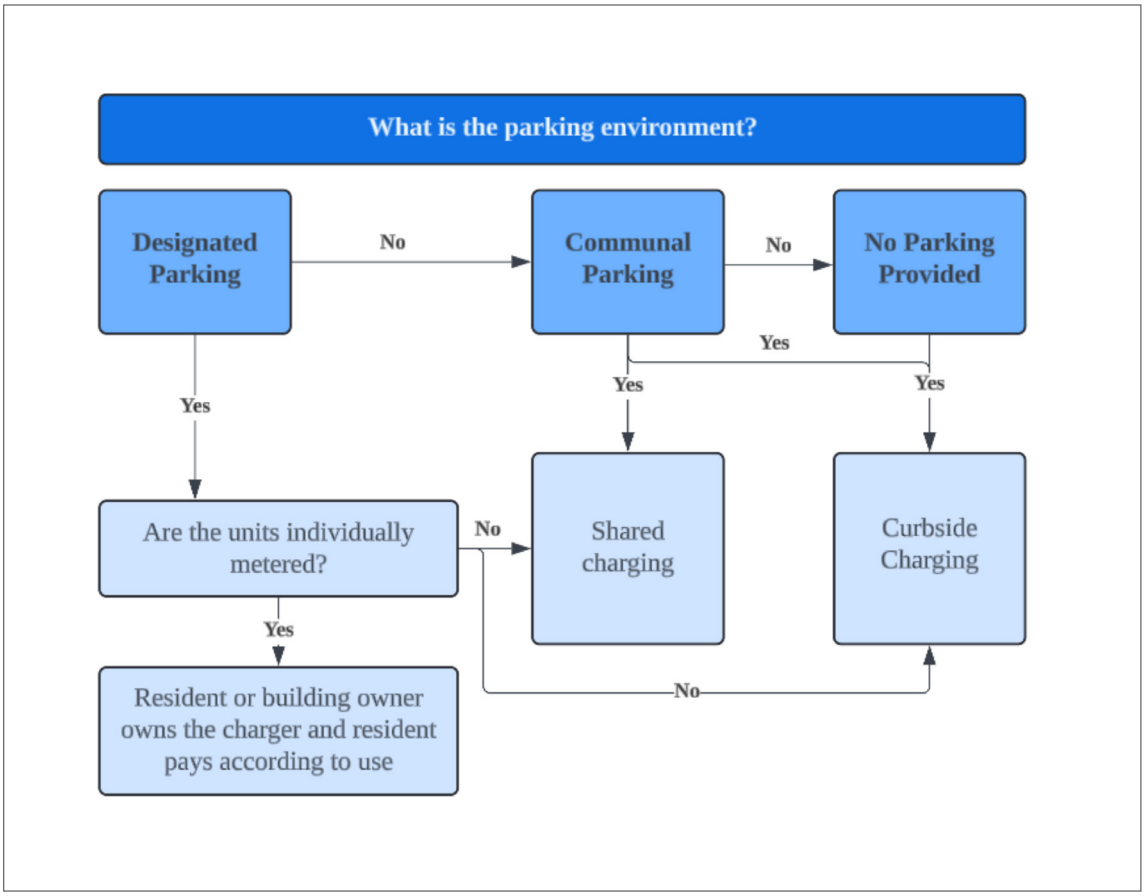
The appropriate layout of EVSE often depends on how the building's units are metered and, assuming parking is available, how spaces are assigned. For example, as shown in Figure 14, it is important for a MFH building owner to choose the appropriate physical structure/layout for EVSE depending on the manner in which parking is provided at the building.

[233] British Columbia Hydro and Power Authority. "EV Charger Rebates for Apartment, Condo, and Townhome Complexes." Accessed June 2024. Available at https://electricvehicles.bchydro.com/incentives/charger-rebates/apartment.

[234] City of Vancouver. "Electric Vehicle Charging for Rental Buildings." Accessed June 2024. Available at https://vancouver.ca/streets-transportation/electric-vehicle-charging-for-rental-buildings.aspx.

[235] District of Saanich. "EV Charging in Existing Multifamily Buildings." Accessed June 2024. Available at https://www.saanich.ca/EN/main/community/sustainable-saanich/EV-Charging-in-Existing-Multifamily-Buildings.html#:~:text=The%20Province's%20CleanBC%20Go%20Electric,one%20EV%20Ready%20parking%20space.

Figure 14: *Layout of EVSE in MFH depending on parking characteristics*[236]



It is possible for building owners to be able to offer dedicated EVSE stations for their residents. However, due to the needed grid capacity and higher costs associated with construction, this is not as common. Instead, as shown in Figure 14, MFH often features three parking environments: parking is not available, communal parking is available, or residents have their own dedicated parking space: [237]

- ***Designated parking space with unit-specific metering:*** The simplest solution for building owners takes place when the resident has their own dedicated parking space and the resident's unit has its own specific meter. Whether the resident or the building owner is the EVSE owner, the electricity consumption from use of the EVSE can be directly attributed to the resident without affecting other residents. Internally metered, software-enabled chargers also offer the ability to individually bill drivers for their consumption and are less expensive to install than an external sub-meter.[238, 239] If the resident owns the EVSE, it would be their responsibility to purchase the EVSE and, if necessary, pay for any upgrades to support it, along with the operations and maintenance (O&M). If the building owner owns the

[236] Joint Office of Energy and Transportation. "Electric Vehicle Charging Solutions for Multifamily Housing: Market Scan." April 2023. Available at https://driveelectric.gov/files/webinar-2023-04-25-community-charging-market-scan.pdf.

[237] *Ibid.*

[238] Morrow, K. Ecotality North America. "EVSE Metering: A Manufacturer's Perspective." June 2011. Available at http://mydocs.epri.com/docs/publicmeetingmaterials/1106/7FNP3F4JZPH/E236437_PHEV_D1_Presentations.pdf.

[239] Leviton Blog. "The Next Step for Electric Vehicle Charging Stations." 2022. Available at https://blog.leviton.com/next-step-electric-vehicle-charging-stations.

EVSE, it is important to address O&M and insurance in lease agreements or association bylaws.[240] Additionally, to offset the costs for equipment, installation, upgrades, and anticipated O&M, building owners can charge EV owners a reasonable fee to use the equipment.

- ***Shared Charging:*** These settings are similar to that of workplace charging (see *Section 4.4*) in that there are several decisions a property owner needs to make to offer charging including, but not limited to, the appropriate ownership model, the right technology, the pricing structure, and the tenant agreements to share the EVSE.[241] In a communal parking setting, we can assume a queue for chargers when there are more EVs than EVSE available to support them, so the time an EV spends charging will need to be relatively short. As such, Level 1 equipment is not likely to satisfy the needs of the EV driver. However, Level 2 and DCFC are more expensive, the former typically ranging from $4,400 to nearly $11,000 for equipment and installation per port and the latter ranging from $100,000 to nearly $200,000 per port for a 150 kW DCFC.[242] Networked Level 2 chargers also offer more flexibility than Level 1 equipment to manage load within the constraints of the building's overall energy consumption.

  In a shared or communal charging scenario, there are different options to ensure that EV drivers pay for the electricity consumed during a charging session without pushing costs onto non-EV driving residents. One option is to is to connect the EV chargers to a separately metered subpanel, and to isolate that meter's billing from the rest of the property's shared common area expenses. This, however, can be costly. Another option is to install networked, software-enabled chargers. Any resident that uses a charger will create an account on the charging network. The network provider then directly bills each driver for the electricity used during their charging sessions. Although the property owner initially pays the utility bill for that electricity, the network provider then remits payment back to the property owner for the individual charging sessions. If the property owner owns or leases the chargers, the property owner typically has full flexibility to determine whether to price the electricity at cost or to add an additional management fee on top of the retail electricity price. An added benefit of this approach is that the chargers' internal metering and the network providers' individualized driver billing obviate the need for separate metering or sub-metering of the chargers.

  The property owner can then establish different pricing plans for those households with access to the shared chargers such as a subscription model or a rent increase, as described further below.
  - *Offering access to EV charging as an amenity to residents.* In a survey of renters, 58% suggested that they would be willing to pay more in rent to have access to charging, and 40% said they would be willing to pay at least $10 more per month.[243] This model, however, has several drawbacks. First, non-EV drivers may not appreciate an increase in rent due to the installation of EVSE because they will not be benefiting from it. Additionally, building owners must be careful not to increase rent to a level that would deter new residents or force current residents to leave.
  - *Developing a subscription model where EV drivers can pay for access to the EVSE.*[244] This allows EVSE drivers to access charging, and better isolates the costs of electricity consumption to EV drivers, without punishing non-EV drivers. The subscription fee could be used to offset costs for the EVSE equipment and installation over time.

[240] *Ibid.*

[241] *Ibid.*

[242] Wood, E., *et al.* National Renewable Energy Laboratory. "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." 2023. Available at https://www.nrel.gov/docs/fy23osti/85654.pdf.

[243] Ascierto, J. "Stat of the Week: EV Charging Stations." *Multifamily Executive.* August 2016. Available at https://www.multifamilyexecutive.com/property-management/apartment-trends/stat-of-the-week-ev-charging-stations_o#:~:text=Of%20the%2015%25%20of%20renters,have%20charging%20stations%20on%20site.

[244] Joint Office of Energy and Transportation. "Electric Vehicle Charging Solutions for Multifamily Housing: Market Scan." April 2023. Available at https://driveelectric.gov/files/webinar-2023-04-25-community-charging-market-scan.pdf.

This monthly fee could be a stand-alone fee or in addition to a per session or kWh fee, but it should not be so high that it discourages participation or eliminates the opportunity for EV drivers to achieve fuel savings from driving an EV.[245, 246]

Regardless of the chosen pricing model, the building owner will likely need to develop rules for tenants to use the EVSE. For example, to avoid a single EV staying plugged in too long, preventing other residents from charging their EVs, building owners can charge "idle fees" which begin when charging is complete. EVSE can also often be set up to provide text alerts when charging is complete to help drivers know when it is time to remove their vehicle from the charger.

Although Level 2 is the most common charging application for the MFH setting, building owners occasionally opt for DCFC to allow for faster charging, thus allowing more tenants to charge. Discussed in further detail in *Section 6.4*, building owners may also be hesitant to purchase and install DCFC due to demand charges or increased on-peak electricity consumption, which is more expensive. In addition to establishment of utility tariffs that do not include demand charges, battery-enabled DCFC allows electricity consumption to occur during off-peak hours and then be distributed as needed during a charging session.[247] Battery-enabled chargers have a higher upfront cost but provide the resident with fast charging without incurring high demand charges. Furthermore, battery-enabled chargers can be deployed anywhere and do not require as much time for site preparation. [248, 249, 250]

- ***No parking is available, and tenants depend on street parking:*** For building owners that do not offer parking to residents, EV owners may be dependent on charging in public garages or on the street. For a more comprehensive overview of curbside charging options, refer to *On-street and curbside charging*.

Commercial Building Code

A key part of expanding access to charging in future commercial buildings is to build them to be ready for EV charging adoption. As discussed in *Sections 3.1* and *4.1*, states and jurisdictions are able to adopt EV-C or EV-R parking spaces in their commercial building codes. Specifically, in Michigan, the BCC can adopt specific commercial energy code language, which has been considered at the IECC (see *Appendix II*). For commercial buildings and multi-family residences, EV-R construction can save about $7,000 to $8,000 in retrofit costs according to a study conducted by the California Air Resources Board.[251]

RECOMMENDATION

Adopt language in the state energy conservation code to require all new homes and buildings to be EV-R.

[245] University of Michigan, Vice President for Communications. "EV transition will benefit most US vehicle owners, but lowest-income Americans could get left behind." *Michigan News.* January 2023. Available at https://news.umich.edu/ev-transition-will-benefit-most-us-vehicle-owners-but-lowest-income-americans-could-get-left-behind/.

[246] Muller, J. "The electric car revolution hinges on equitable, affordable charging." *Axios.* February 2023. Available at https://www.axios.com/2023/02/08/electric-vehicle-charging-stations-equity?utm_medium=email.

[247] *Ibid.*

[248] *Ibid.*

[249] Wood, E., *et al.* National Renewable Energy Laboratory. "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." 2023. Available at https://www.nrel.gov/docs/fy23osti/85654.pdf.

[250] FreeWire. "FreeWire Pro Series." Accessed June 2024. Available at https://freewiretech.com/dc-boost-charger/.

[251] California Air Resources Board. "EV Charging Infrastructure: Nonresidential Building Standards." November 2019. Available at https://ww2.arb.ca.gov/sites/default/files/2020-08/CARB_Technical_Analysis_EV_Charging_Nonresidential_CALGreen_2019_2020_Intervening_Code.pdf.

Therefore, it is more cost-effective to ensure a commercial building is EV-R when it is being built or undergoing major renovations than to conduct these extensive electrical upgrades when a charger is later installed.

Resident Rights

In addition to ensuring that MFH property owners have access to the resources they need to understand their residents' charging needs, as well as their buildings' charging capabilities, renters should also be provided with assurances that they have a right to charge, regardless of their housing environment.

States have addressed access to charging at MFH properties with "Right to Charge" legislation. For example, in July 2023, Illinois Governor Pritzker signed the Electric Vehicle Charging Act into Law, which sets certain EV-R requirements for newly constructed SFH and MFH residential buildings, and also provides unit owners the right to install EVSE in their designated parking space upon Board approval.[252] Below are some other examples of "Right to Charge" legislation that focus on MFH buildings:

- ***Colorado HB 23-1233 Revised Statutes 38-12-601*** indicates that "[a] tenant may install, at the tenant's expense for the tenant's own use, a [L]evel 1 or [L]evel 2 electric vehicle charging system on or in: [t]he leased premises; an assigned or deeded parking space that is part of or assigned to the leased premises; or…a parking space that is accessible to both the tenant and other tenants."[253]

- ***Maryland, Real Property Section 11-111.4*** states that a restriction or provision that "[e]ffectively prohibits or unreasonably restricts the installation or use of electric vehicle recharging equipment in a unit owner's deeded parking space or a parking space that is specifically designated for use by a particular owner" is "void and unenforceable."[254]

- ***New Jersey Public Law 45:22A-43*** states that, for a common interest community "[a]ny covenant, restriction, or condition…that either prohibits or unreasonably restricts the installation or use of an electric vehicle charging station in a designated parking space, or is in conflict with the provisions of this section, is void and unenforceable."[255]

- ***Florida Statute 718.113, Section 3, Subsection 8*** finds that "[a] declaration of condominium or restrictive covenant may not prohibit or be enforced so as to prohibit any unit owner from installing an electric vehicle charging station… within the boundaries of the unit owner's limited common element or exclusively designated parking area. The board of administration of a condominium association may not prohibit a unit owner from installing an electric vehicle charging station…within the boundaries of [their] limited common element or exclusively designated parking area."[256]

Other states with similar legislation are California, Connecticut, New York, Oregon, Virginia, and Washington.[257] While "Right to Charge" legislation can be incredibly useful to ensure unit owners with a designated parking space are not prohibited from installing charging, few enforce similar rules for renters, or unit owners who use communal parking. Currently, only California and Colorado specifically address renters' right to charge in a leased space.[258] Consequently, due to the difficulty for MFH residents to charge at home, ensuring that public charging is effectively and equitably deployed becomes critical to enabling more widespread EV adoption.

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[252] Illinois Legislature. Illinois 765 ILCS 1085. "Electric Vehicle Charging Act." July 2023. Available at https://ilga.gov/legislation/ILCS/ilcs3.asp?ActID=4407&ChapterID=62.

[253] Colorado Legislature. Colorado House Bill 23-1233. May 2023. Available at https://leg.colorado.gov/sites/default/files/2023a_1233_signed.pdf.

[254] Maryland Legislature. Maryland Article - Real Property: Section 11-111.4. Accessed June 2024. Available at https://mgaleg.maryland.gov/mgawebsite/Laws/StatuteText?article=grp&section=11-111.4&enactments=False&archived=False.

[255] New Jersey Legislature. New Jersey Public Law 1993. October 2020. Available at https://pub.njleg.state.nj.us/Bills/2020/PL20/108_.PDF.

[256] Florida Legislature. Florida Statute 718.113, Section 3, Subsection 8. 2023. Available at http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0700-0799/0718/Sections/0718.113.html.

[257] Plug In America. "Right to Charge Policies." Accessed June 2024. Available at https://pluginamerica.org/policy/right-to-charge-policies/.

[258] The Conversation and E. Kontou. "Right-to-charge Laws Bring the Promise of EVs to Apartments, Condos, and Rentals." *Fast Company.* July 2023. Available at https://www.fastcompany.com/90917445/right-to-charge-laws-bring-the-promise-of-evs-to-apartments-condos-and-rentals.

RECOMMENDATION

Pass new legislation ensuring homeowners and renters living in condominiums and multi-family housing cannot be unreasonably prevented from installing EV chargers.

Section 4.3: Public Charging

In 2022, the California Energy Commission released a study that modeled different EV at-home charging scenarios based on improved education, increased electrical access, and shifts in parking behavior, ultimately determining that even the most optimistic scenario indicates that 30% of EVs would still be dependent on public charging infrastructure.[259] As such, the importance of building out public charging cannot be understated. To address this demand, public and workplace charging in the U.S. will need to grow by over 1,000% - from 216,000 to 2.4 million - between 2020 and 2030, which will require $28 billion in investment.[260, 261] In 2016, there were seven EVs to each public charging port in the U.S. By 2023, however, EV adoption grew nearly three times faster than public charging infrastructure, meaning there are now over 20 EVs per public charging port.[262, 263] Figure 15 shows that the expected electricity usage by public charging will increase over 60% between 2021 and 2030. Should the ratio of EVs to public charging ports continue to increase, EV drivers will face significant inconveniences to charge their vehicles, which could lead to buyer's remorse among this growing consumer base.[264]

[259] Alexander, M. California Energy Commission. "Home Charging Access in California." January 2022. Publication Number: CEC-600-2022-021. Available at https://www.energy.ca.gov/sites/default/files/2022-01/CEC-600-2022-021.pdf.

[260] Bauer, G., *et al.* The International Council of Clean Transportation. "Charging Up America: Assessing the Growing Need for U.S. Charging Infrastructure through 2030." July 2021. Available at https://theicct.org/wp-content/uploads/2021/12/charging-up-america-jul2021.pdf.

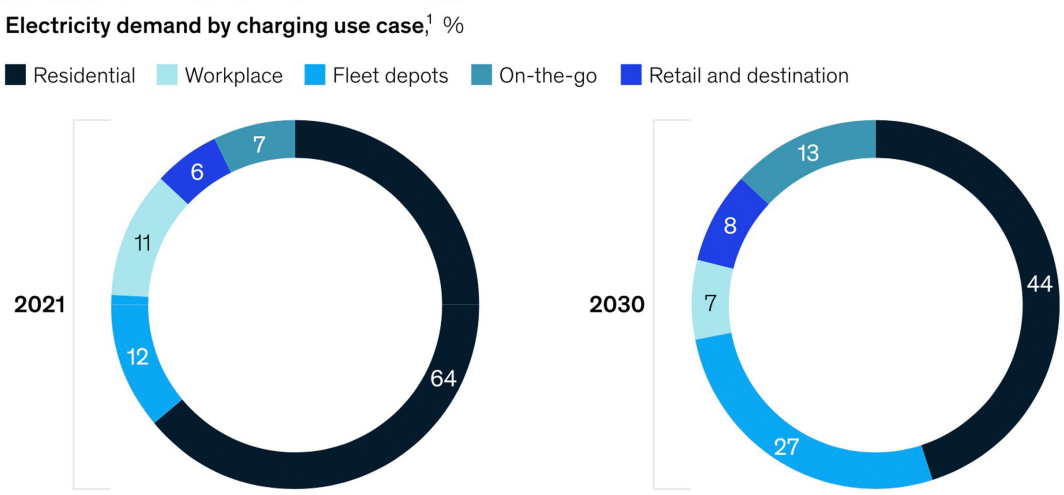
[261] Kampshoff, P., *et al.* McKinsey and Company. "Building the Electric-vehicle Charging Infrastructure America Needs." April 2022. Available at https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs.

[262] Osaka, S. "For Each Public Charger, Here's How Many EVs are Looking to Plug in." *The Washington Post.* May 2024. Available at https://www.washingtonpost.com/climate-solutions/2024/05/20/charging-stations-lag-ev-sales/.

[263] International Energy Agency. "Trends in electric vehicle charging." Accessed June 2024. Available at https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-vehicle-charging.

[264] Bigelow, P., "More Than 40% of U.S. EV Buyers Want to go Back to Combustion Engine Cars, McKinsey and Company Surveys." *Automotive News.* June 2024. Available at https://www.autonews.com/mobility-report/40-us-ev-owners-want-return-combustion-engine-cars.

Figure 15: Public chargers would need to deliver more than 20% of the electricity consumed by electric vehicles in 2030[265]



Note: Figures may not sum to 100%, because of rounding.
[1] Based on a scenario where zero-emissions vehicles (battery-electric vehicles, plug-in hybrid electric vehicles, fuel-cell electric vehicles) account for half the vehicles sold in the United States in 2030, in line with a federal target.
Source: McKinsey Center for Future Mobility

These issues are likely to be exacerbated by increasing EV adoption among low- and middle-income households and renters. The income of today's average EV driver is more than twice the national median.[266] As such, except for long-distance travel, current EV owners are largely homeowners who typically use Level 1 or Level 2 chargers at home. However, as EV prices continue to decrease and used EVs hit the market, EV adoption will increase among low- and middle-income households.[267] As of 2020, this market segment made up one-sixth of EV owners, but the ICCT predicts that its share of the EV market will increase to 25% of new EV owners by 2030.[268] Unlike current EV owners, these drivers are less likely to have access to at-home charging and are, consequently, more likely to be dependent on public charging infrastructure (Figure 16). In fact, a study from the University of California – Los Angeles shows that 43% of multifamily residents rely on public DCFC stations for their primary means of charging.[269] Failure to build robust public charging in all communities, including low- and middle-income communities, risks stagnant EV adoption growth among these customer segments.

[265] Kampshoff, P., *et al.* McKinsey and Company. "Building the Electric-vehicle Charging Infrastructure America Needs." April 2022. Available at https://www.mckinsey.com/industries/public-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs.

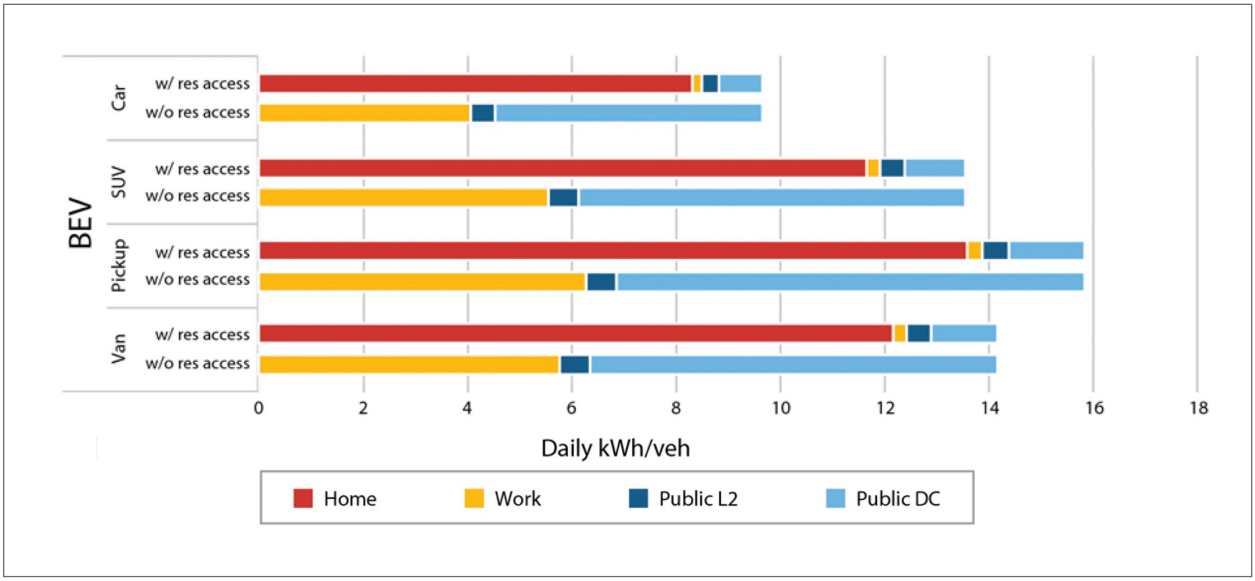
[266] Savies, A. "Electric Car Owners are Richer and Smarter than the Average American." *Business Insider.* November 2012. Available at https://www.businessinsider.com/electric-car-owners-are-richer-and-smarter-2012-11.

[267] Coren, M. "I Found a $2,100 EV. Here's How You Can Too." *The Washington Post.* April 2024. Available at https://www.washingtonpost.com/climate-environment/2024/04/30/cheap-electric-cars/.

[268] Bauer, G., *et al.* The International Council of Clean Transportation. "Charging Up America: Assessing the Growing Need for U.S. Charging Infrastructure through 2030." July 2021. Available at https://theicct.org/wp-content/uploads/2021/12/charging-up-america-jul2021.pdf.

[269] DeShazo, J.R. and J. Di Filippo. UCLA Luskin Center for Innovation. "Evaluating Multi-Unit Resident Charging Behavior at Direct Current Fast Chargers." February 2021. Available at https://innovation.luskin.ucla.edu/wp-content/uploads/2021/03/Evaluating-Multi-Unit-Resident-Charging-Behavior-at-Direct-Charging-Behavior-at-Direct-Current-Fast-ChargersCurrent-Fast-Chargers.pdf.

Figure 16: *Average daily charging demand simulated by EVI-Pro for typical daily travel, broken out by body style and residential access*[270]



There are many different public charging use cases, solutions, and business models that should be leveraged to ensure every Michigander can charge in public with confidence. As outlined below, there are several opportunities to enhance existing public charging infrastructure via investments from federal and state programs, utilities, automotive OEMs, EVSPs, and businesses.

Federal Opportunities

NEVI Formula Program

Congress passed the Infrastructure Investment and Jobs Act (IIJA) in November 2021, which established the NEVI Formula Program to "provide [$5 billion in] funding to states to strategically deploy electric vehicle charging stations and establish an interconnected network to facilitate data collection, access, and reliability."[271] Charging stations must be located along Alternative Fuel Corridors (AFCs), designated by a collaborative process between the FHWA, state and local officials, and industry stakeholders that identifies areas in critical need of charging infrastructure along Interstate corridors and the National Highway System.[272, 273, 274]

Michigan will receive $110.1 million in funding under the NEVI Formula Program through Fiscal Year (FY) 2026 to complement its existing EV charging investments like Charge Up Michigan and the Lake Michigan Circuit (described below).[275] MDOT completed an analysis to optimize Michigan's NEVI funds, resulting in 47 "nodes," or priority locations for chargers, along the AFCs, as seen in the map below (Figure 17).

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[270] Wood, E., *et al.* National Renewable Energy Laboratory. "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." 2023. https://www.nrel.gov/docs/fy23osti/85654.pdf.

[271] U.S. Department of Energy. Alternative Fuels Data Center. "National Electric Vehicle Infrastructure (NEVI) Formula Program." Accessed June 2024. Available at https://afdc.energy.gov/laws/12744.

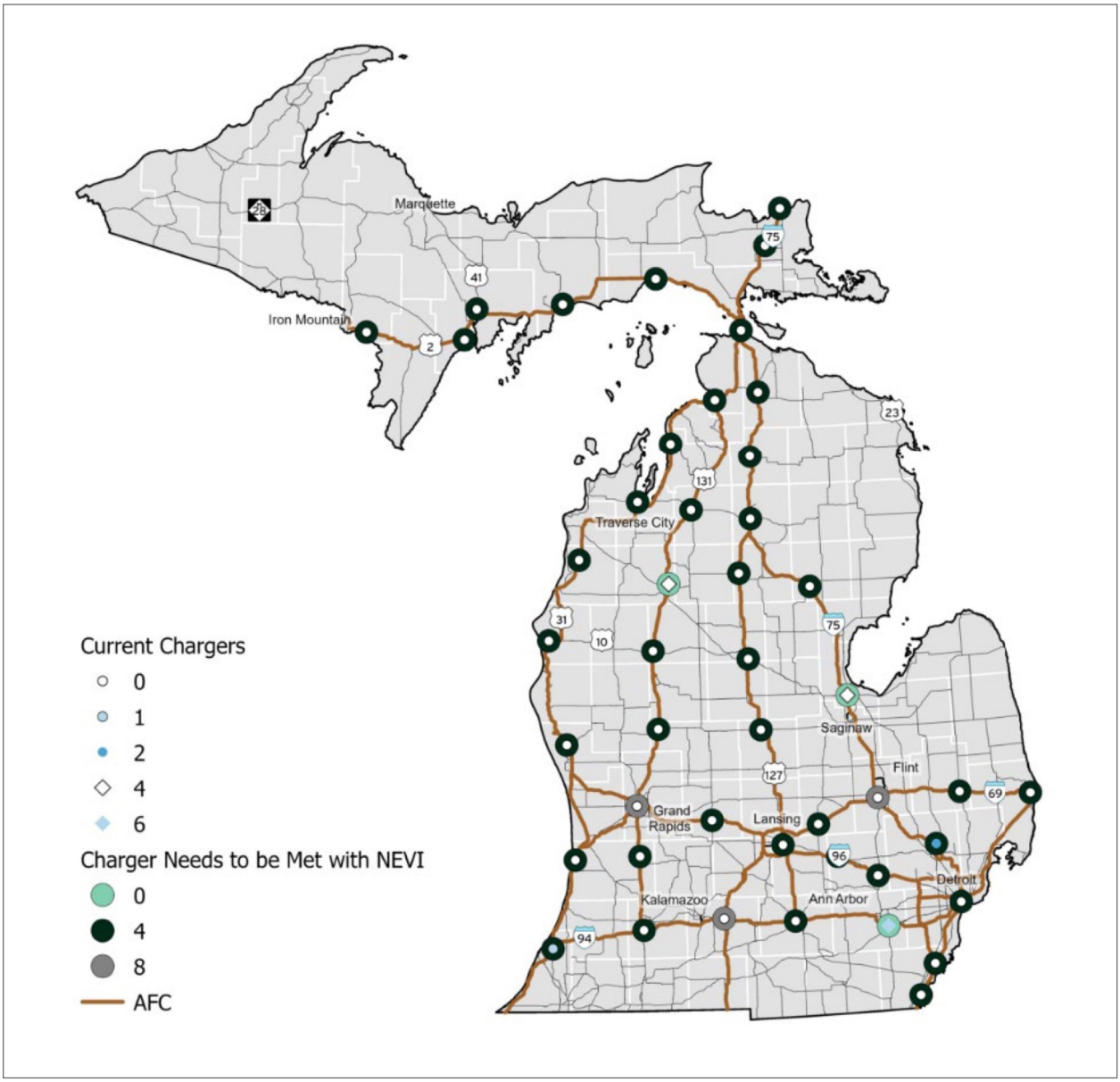
[272] Michigan Department of Transportation. "Michigan State Plan for Electric Vehicle Infrastructure Deployment." August 2023. Available at https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Travel/Mobility/Mobility-Initiatives/NEVI/FY23-MI-Plan-for-EV-Infrastructure-Deployment.pdf?rev=968c7cbcf92c4b2abb08573f2af0f9f5&hash=409ED1B68C1FBEE6E52E334690405162.

[273] U.S. Department of Energy. Alternative Fuels Data Center. "National Electric Vehicle Infrastructure Formula Program." Accessed June 2024. Available at https://afdc.energy.gov/laws/12744.

[274] U.S. Department of Energy. Alternative Fuels Data Center. "National Alternative Fuel Corridors." Accessed June 2024. Available at https://afdc.energy.gov/laws/11675.

[275] Michigan Department of Transportation. "National Electric Vehicle Infrastructure Formula Program." Accessed June 2024. Available at https://www.michigan.gov/mdot/travel/mobility/initiatives/nevi.

Figure 17: *NEVI-eligible nodes identified in Michigan*[276]



NEVI-compliant charging sites include a minimum of four Combined Charging System (CCS) ports capable of simultaneously and continuously charging four EVs at 150 kW-or-greater at a given time. Sites must be located within one mile driving distance of a Michigan AFC and at intervals of no more than 50 miles along each of the state's designated AFCs.

In February 2024, MDOT awarded its first round of NEVI funding to 41 projects at 35 of the 47 nodes (Figure 18), totaling $23 million.[277] Of the awardees, 50% of the projects were granted to EVSPs, 40% to convenience/fueling station companies, and 10% to co-ops, grocers, and automotive manufacturers.[278]

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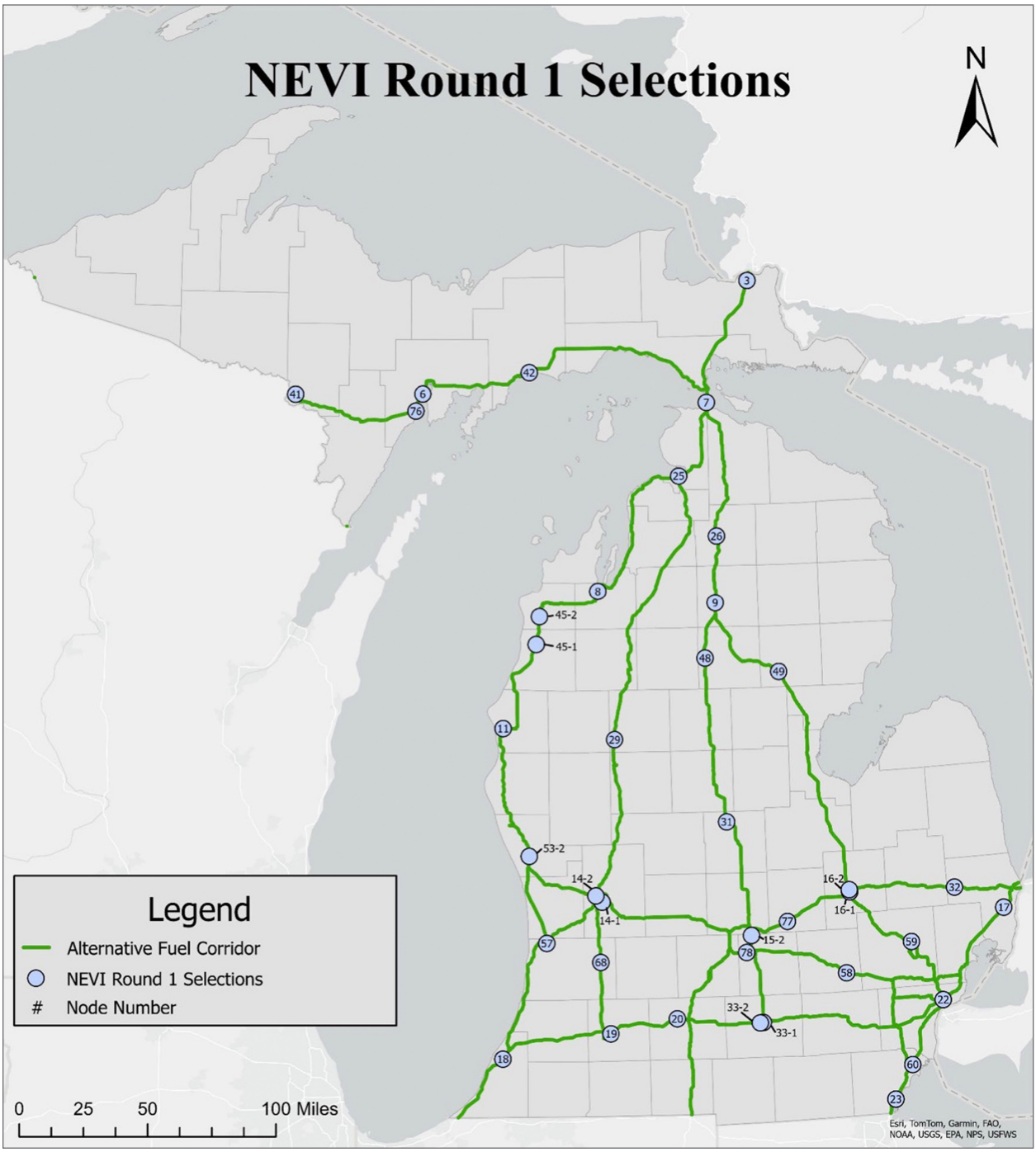
[276] Michigan Department of Transportation. "Michigan State Plan for Electric Vehicle Infrastructure Deployment." August 2023. Available at https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Travel/Mobility/Mobility-Initiatives/NEVI/FY23-MI-Plan-for-EV-Infrastructure-Deployment.pdf?rev=968c7cbcf92c4b2abb08573f2af0f9f5&hash=409ED1B68C1FBEE6E52E334690405162.

[277] Michigan Department of Transportation. "MDOT NEVI Design-Build-Operate-Maintain (DBOM) Project." April 2024. Available at https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Business/Contractors/Innovative-Contracting/NEVI/Round-1-Notification-of-Selection.pdf?rev=6244d0487b4a4e20a812ae9b9150166c&hash=76008311BABBA3F0AFD1137E0EBAB3DA.

[278] *Ibid.*

Figure 18: *Michigan's NEVI Round 1 selected sites*[279]



With project costs lower than originally anticipated, MDOT will have $87.2 million to distribute in Rounds 2 - 6. In Round 2, MDOT intends to fill 35 gaps along Michigan's AFCs (Figure 19), which it estimates will cost $27 million. Round 2 NEVI funds are expected to be awarded in April 2025.[280] Once the NEVI requirement for compliant charging sites at least every 50 miles along the AFCs is met, Michigan will be able to use NEVI funding for other public chargers including those off AFCs in rural and DACs.

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[279] *Ibid.*

[280] Michigan Department of Transportation. "National Electric Vehicle Infrastructure (NEVI) Round 2: Design-Build-Operate-Maintain (DBOM) Project Statewide." July 2024. Available at https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Business/Contractors/Innovative-Contracting/NEVI---2/Industry-Forum-Workshop.pdf?rev=631ecb94e54343eeaeb46e7717c8bcbd&hash=0F9031F7F4F5F9EF24905EEA667AD5F2.

Figure 19: *NEVI Formula Program Round 2 Gaps*[281]

Charging and Fueling Infrastructure Grant Program

The IIJA also created the Charging and Fueling Infrastructure Discretionary Grant Program.[282] With $2.5 billion available over five years, this competitive grant program is managed by FHWA to strategically deploy publicly accessible EV charging and alternative fueling infrastructure across communities, particularly in underserved and disadvantaged communities. States, metropolitan planning organizations, local governments, Native American Tribes, and more can apply individually or jointly. Applicants can submit for two tracks:[283]

1. ***The Community Charging and Alternative Fueling Grants (Community Program):*** This can go towards EV charging and alternative fuel installations in locations on public roads, schools, parks, and publicly accessible parking facilities.
2. ***The Charging and Alternative Fuel Corridor Grants (Corridor Program):*** This can go towards deploying EV charging and alternative fuel infrastructure along designated AFCs.

In May 2024, FHWA awarded $623 million in grant funding to 47 applicants across 22 states and Puerto Rico, including Michigan.[284] In Round 1, $8 million was awarded to the City of Lansing for the Michigan Capitol Area Regional EV Charging Gateway Initiative as part of the Community Program. The initiative seeks to increase available EVSE by at least 25% (up to 50 stations) and will also include education and outreach on electric mobility and transportation decarbonization for the public and other stakeholders.[285] Other grant awards across the country included, for example (Table 6):

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[281] Michigan Department of Transportation. "National Electric Vehicle Infrastructure (DBOM) - Round 2." Accessed June 2024. Available at https://www.michigan.gov/mdot/business/contractors/innovativecontracting/national-electric-vehicle-infrastructure-2.

[282] U.S. Department of Transportation. "Charging and Fueling Infrastructure Grant Program." Accessed June 2024. Available at https://www.transportation.gov/rural/grant-toolkit/charging-and-fueling-infrastructure-grant-program.

[283] *Ibid.*

[284] *Ibid.*

[285] U.S. Department of Transportation. Federal Highway Administration. "FY 2022 and 2023 Grant Award Recipients." Accessed June 2024. Available at https://www.fhwa.dot.gov/environment/cfi/grant_recipients/past_recipients/.

Table 6: *Selection of Round 1 grantees*[286]

State	Project Name	Lead Applicant	Amount	Project Description
AZ	EV Charging Port and Infrastructure Project	San Carlos Apache Tribal Council	$500,000	Install four EV charging station sites within the Reservation and one additional station in Safford, Arizona. The project will benefit the San Carlos, Peridot, and Bylas communities by providing healthier air quality, creating positive environmental impacts, stimulating the local economy, and will provide critically necessary services.
CO	Charge Up Boulder County: Better Access for EV Charging	County of Boulder	$4,900,000	Install 94 Level 2 and 20 DCFC charging stations. The project advances the county's commitment to an equitable transition to zero-emission transportation by focusing on filling gaps in the publicly accessible EV charging network by installing chargers in low and moderate-income neighborhoods, rural areas, and neighborhoods with high densities of multifamily unit dwellings.
ID	Increasing Access to Electric Vehicle Charging Infrastructure in Boise, Idaho Through Infrastructure Deployment and Workforce Development	City of Boise	$3,200,000	Implement public electric vehicle charging sites, install an estimated 100 Level 2 charging ports across 20-25 sites, and 4-8 DCFC ports across 2-4 sites. The project focuses site selection in underserved communities, increases community outreach, and creates an EV workforce development program.
MO	City of Columbia Charging and Fueling Infrastructure Discretionary Grant Program	City of Columbia	$3,610,708	Build 44 new EV chargers at two parking garages, a public library, and the regional airport. Funds will also be used for project planning, communications, engagement and public education about the new EV charging network, particularly in disadvantaged communities surrounding Columbia.
NJ	Expanding Access to EV Charging for New Jersey's Multifamily Households	New Jersey Department of Environmental Protection	$10,000,000	Build EV charging stations for residents of multi-family housing in low and moderate-income neighborhoods, underserved communities, and rural areas. The project will fill gaps in EV charging infrastructure and target areas near transit stations to encourage the use of shared transportation services such as electric carshare and rideshare options.
TX	Charging and Fueling Infrastructure Community Program to Implement the North Texas Equitable Electric Vehicle Infrastructure (NTx–EEVI) Project	North Central Texas Council of Governments	$15,000,000	The North Central Texas Council of Governments will receive $15 million to install up to 100 charging ports at publicly accessible EV charging stations throughout the 16-county Dallas-Fort Worth region. The project aims to take a regionwide approach to electrification by expanding and filling gaps to access EV infrastructure in underserved communities and to reduce greenhouse gas emissions.
WA	Catalyzing Zero–Emission Drayage Trucking Infrastructure & Opportunities in the Seattle– Tacoma Region	Northwest Seaport Alliance	$12,000,000	Manage a competitive program leading to development of one or more shared electric truck charging hubs, which will serve a network of about 4,500 heavy-duty trucks that provide cargo hauling services to the ports of Seattle and Tacoma. The project also will help reduce emissions from an estimated 300 diesel trucks, including greenhouse gas emissions that disproportionately impact disadvantaged, overburdened communities living near the seaports and along major freight corridors between Seattle and Tacoma.

[286] *Ibid.*

State Programs in Michigan

Charge Up Michigan

In the fall of 2015, Volkswagen publicly admitted that it had installed emissions control defeat devices – software designed to cheat emissions tests and deceive federal and state regulators – in certain vehicles. As a result of the litigation that ensued, an Environmental Mitigation Trust (Trust) was established as part of two partial consent decrees to resolve, among other things, claims concerning excess nitrogen oxide (NO_x) emissions from Volkswagen's 2.0-liter and 3.0-liter diesel engine vehicles equipped with defeat devices. The Trust allocated more than $2.8 billion to the U.S., Puerto Rico, and the District of Columbia to fund environmental mitigation actions that reduce NO_x emissions.[287] In accordance with the State Trust Agreement, Michigan developed the Michigan Volkswagen Settlement Beneficiary Mitigation Plan that outlines how it would administer the more than $64 million of settlement funds it was allocated.[288]

Facilitated by EGLE's Charge Up Michigan Program, part of Michigan's Volkswagen settlement funds are allocated to the build out of a DCFC charging network in Michigan to support the feasibility of long-distance trips for EV drivers.[289] The projects funded are selected based on EV charger optimization reports developed by Michigan State University that predict the optimal number and placement of EVSE with priority being given to those projects filling the charging gaps as identified in EGLE's Michigan Electric Vehicle Infrastructure Programs Map.[290] Grant amounts are the lesser of 33.3% of the total cost or a direct match of the amount the electric utility is paying, up to $70,000, and are rewarded only for eligible DCFC EV charging equipment, site preparation, installation, networking fees, and signage.[291] As of 2022, of the $20.6 million in available funding, the program has invested $16.1 million in EV charging stations and the installation of 276 chargers.[292]

Lake Michigan Circuit Grants

Governor Whitmer, through the Lake Michigan EV Circuit Memorandum of Understanding (MOU) between Michigan, Wisconsin, Illinois, and Indiana, established the Lake Michigan EV Circuit in 2022.[293] This is a multi-state partnership proposal to build a route of reliable charging stations for light-duty EVs along Lake Michigan's 1,100 mile drivable coastline.[294] Charging stations are being installed at recreational areas, hospitality businesses, and entertainment attractions to benefit regional, state, and local tourism economies, promote the use of state and national parks and lakeshores, and support small businesses and municipalities. In 2023, EGLE announced it would review applications for projects and would have $1.225 million available for distribution in Round 1, with $325,000 available for Level 2 EVSE and $900,000 for DCFC. Like the Charge Up Michigan Program, the grant amount will be the lesser of 33.3% of the total cost or a direct match of the amount paid by the electric utility - up to $5,000 for Level 2 and up to $70,000 for DCFC.[295] Grants are available to any public, private, non-profit, or other entity physically located in Michigan and can only be used for costs directly related to the design, build, operation, and maintenance of the EVSE.

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[287] U.S. Environmental Protection Agency. "Volkswagen Clean Air Act Civil Settlement." Accessed June 2024. Available at https://www.epa.gov/enforcement/volkswagen-clean-air-act-civil-settlement.

[288] Michigan Department of Environment, Great Lakes, and Energy. "Michigan Volkswagen Settlement Beneficiary Mitigation Plan." August 2019. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/MMD/Fuel-Transformation/MI-Volkswagen-Settlement-Beneficiary-Mitigation-Plan.pdf?rev=6d454bfa2b2748b3ae69e8cee95d6cab&hash=464107FBAB51D36BEBB23CE73F24C38A#:~:text=The%20goals%20of%20the%20Michigan%20Beneficiary%20Mitigation%20Plan%20are%3A&text=To%20reduce%20NOx%20emissions%20and,National%20Ambient%20Air%20Quality%20Standards).

[289] Michigan Department of Transportation. "Michigan State Plan for Electric Vehicle Infrastructure Deployment." August 2022. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/MMD/Energy/NEVI/MI-Plan-for-EV-Infrastructure-Deployment.pdf.

[290] Michigan Department of Environment, Great Lakes, and Energy. "Michigan Electric Vehicle Infrastructure Programs Map." Accessed June 2024. Available at https://egle.maps.arcgis.com/apps/webappviewer/index.html?id=2c82b996255844b6967d3c46b072c0bd.

[291] Michigan Department of Environment, Great Lakes, and Energy. "Charge Up Michigan Program." Accessed June 2024. Available at https://www.michigan.gov/egle/about/organization/materials-management/energy/rfps-loans/charge-up-michigan-program.

[292] Michigan Department of Transportation. "Michigan State Plan for Electric Vehicle Infrastructure Deployment." August 2022. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/MMD/Energy/NEVI/MI-Plan-for-EV-Infrastructure-Deployment.pdf.

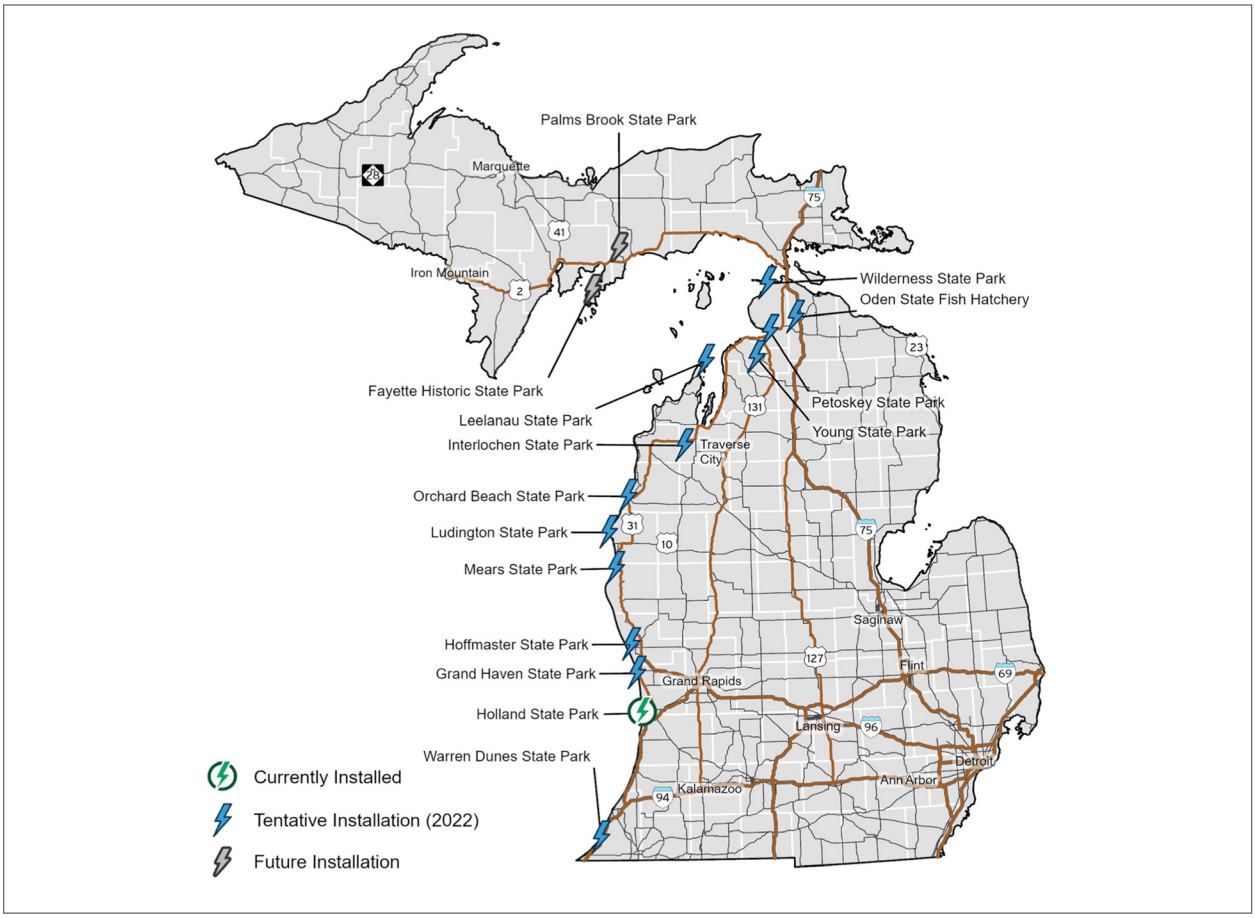
[293] State of Michigan. "Lake Michigan Electric Vehicle Circuit Tour Memorandum of Understanding Between Illinois, Indiana, Michigan, and Wisconsin." June 2023. Available at https://www.michigan.gov/leo/-/media/Project/Websites/leo/Lake_MI_Circuit_MOUdocx1.pdf.

[294] *Ibid.*

[295] Michigan Department of Environment, Great Lakes, and Energy. "Lake Michigan Circuit." Accessed June 2024. Available at https://www.michigan.gov/egle/about/organization/materials-management/energy/rfps-loans/lake-michigan-circuit.

According to Michigan State University's optimization modeling for the Lake Michigan Circuit, DCFC funded by the NEVI program will seek to address a portion of the fast-charging and Level 2 charging demand along the Lake Michigan Circuit.[296] From this study, EGLE determined the need for 183 needed chargers - 137 Level 2 and 46 DCFC (Figure 20). As of June 2024, only six of the needed projects had been funded.[297] However, in July 2024, EGLE announced 17 awards of over $900,000 to proposed projects along the Lake Michigan Circuit, which will support the installation of an additional 12 DCFC and 12 Level 2 chargers.[298]

Figure 20: *Lake Michigan EV Circuit*[299]



RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

[296] Michigan Department of Environment, Great Lakes, and Energy. "Lake Michigan Electric Vehicle Circuit." November 2023. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/MMD/Energy/NEVI/2023-11-10-Lake-Michigan-Circuit-Project-Michigan-Report-Final.pdf?rev=2f0f38c4de8a442ea798e6ab399ff794&hash=0A102322BE08B0E59593A47E351E1094.

[297] Michigan Department of Environment, Great Lakes, and Energy. "Michigan Electric Vehicle Infrastructure Programs Map." Accessed June 2024. Available at https://egle.maps.arcgis.com/apps/webappviewer/index.html?id=2c82b996255844b6967d3c46b072c0bd.

[298] Michigan Department of Environment, Great Lakes, and Energy. "Accelerating an EV road trip: EGLE announces grants to drive Lake Michigan Circuit program." July 2024. Available at https://www.michigan.gov/egle/newsroom/press-releases/2024/07/17/accelerating-an-ev-road-trip#:~:text=Awards%20of%20more%20than%20%24900%2C000,multistate%20Lake%20Michigan%20Circuit%20initiative.

[299] Michigan Department of Transportation. "Michigan State Plan for Electric Vehicle Infrastructure Deployment." August 2022. Available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/MMD/Energy/NEVI/MI-Plan-for-EV-Infrastructure-Deployment.pdf.

Utility Programs

Utility investment in public charging is complementary to programs offered by states and local governments. Table 7 details example incentives for public charging installations provided by Michigan's electric utilities.

Table 7: *Examples of approved Michigan utility programs targeted to public charging applications*

Utility Name	Program	Details
Consumers Energy	PowerMIDrive	Consumers Energy offers a community charging center[300] and workplace charging rebates[301] of up to $7,500 for Level 2 chargers with at least two ports on 100 amps of service. The community charging rebate also offers rebates for Level 1 charging with at least five ports.[302] For both, separate metering is required on the commercial TOU rate to encourage off-peak charging.[303, 304] Workplace charging that is offered near a MFH or residential area can receive a higher rebate for opening the EVSE up to the public after business hours.[305]
DTE Energy	Charging Forward	Workplace, retail and public charging rebate applicants are eligible for $2,000 per Level 2 station port or up to $55,000 per charger for DCFC. [306] To qualify for DCFC installations, no more than $100,000 can be required of DTE to fund electrical system upgrades.[307] Those proposed sites located in close proximity to other consumer amenities and highways will be given priority.[308]
I&M	IM Plugged In	Smaller commercial customers that average less than 4,500 kWh of electricity consumption per month are eligible for a $500 incentive and a discounted TOU rate up to 45% lower than the standard rate.[309] Applicants must be a Michigan-registered employee-owned company.[310] Commercial and Industrial applicants are eligible for a charger rebate. I&M will pay $2,500 for the first port and $500 for each port thereafter.[311] Based on anticipated revenue, I&M can waive upgrade investment costs associated with adding new service.[312]
Upper Peninsula Power Company (UPPCO)	Pilot programs	In 2022, UPPCO was approved to create a regulatory asset of up to $750,000 to support its contribution in support of EV charger deployment in partnership with EGLE.[313, 314] Through this program, EGLE, UPPCO, and UPPCO customers will each pay one third of the associated, with UPPCO's contribution capped at $70,000.[315]

[300] Consumers Energy. "Community EV Charging Rebate." Accessed June 2024. Available at https://www.consumersenergy.com/business/products-and-services/electric-vehicle-support-for-business/community-ev-charging-rebate.

[301] Consumers Energy. "Workplace Charging Rebates." Accessed June 2024. Available at https://www.consumersenergy.com/business/electric-vehicles/workplace-charging-rebates.

[302] Consumers Energy. "Community EV Charging Rebate." Accessed June 2024. Available at https://www.consumersenergy.com/business/products-and-services/electric-vehicle-support-for-business/community-ev-charging-rebate.

[303] *Ibid.*

[304] Consumers Energy. "Workplace Charging Rebates." Accessed June 2024. Available at https://www.consumersenergy.com/business/electric-vehicles/workplace-charging-rebates.

[305] *Ibid.*

[306] DTE Energy. "Business EV Charger Rebate." Accessed June 2024. Available at https://www.dteenergy.com/us/en/business/service-request/pev/pev-biz-charge-frwd.html.

[307] DTE Energy. "DCFC Site Requirements." Accessed June 2024. Available at https://www.dteenergy.com/content/dam/dteenergy/deg/website/business/service-and-price/pev/plug-in-electric-vehicles-pev/DCFCSiteRequirements.pdf.

[308] *Ibid.*

[309] Indiana & Michigan Power. "Charge at Work in Michigan." Accessed June 2024. Available at https://www.indianamichiganpower.com/clean-energy/electric-cars/business/charge-at-work-michigan.

[310] *Ibid.*

[311] *Ibid.*

[312] *Ibid.*

[313] Michigan Public Service Commission. "MPSC Approves Pilot Program to Expand Installation of Electric Vehicle Chargers in Upper Peninsula." April 14, 2022. Available at https://www.michigan.gov/mpsc/commission/news-releases/2022/04/14/mpsc-approves-pilot-program.

[314] Michigan Public Service Commission Order. "Docket U-21137: In the Matter of the Application of Upper Peninsula Company for Authority to Amend its Commercial General Service Tariff to Provide Expanded Use of Electric Vehicle Charging Stations and Related Approvals." April 14, 2022. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000002dQLwAAM.

[315] *Ibid.*

RECOMMENDATION

Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.

Automotive OEMs

Automotive original equipment manufacturers (OEMs) also have a vested interest in ensuring that the charging infrastructure to support the vehicles being developed is readily available to consumers. By investing in expanding public charging infrastructure, OEMs may in fact expedite EV adoption among consumers. In 2022, Michigan celebrated the installation of 15 new EV charging stations at Holland State Park through a partnership with Adopt a Charger and EV automaker, Rivian.[316] This project is in support of a phased deployment of EVSE installations as part of the Lake Michigan EV Circuit and across the state. Rivian, under an operating agreement with Adopt a Charger and the Michigan Department of Natural Resources (DNR) is providing Level 2 Rivian Waypoints chargers at no cost to the state or its taxpayers.

In mid-2023, seven major global automakers - BMW Group, General Motors, Honda, Hyundai, Kia, Mercedes-Benz Group, and Stellantis NV - established a joint venture, named IONNA, to deploy at least 30,000 high-powered charge points along highways and within communities across North America,[317] with the first projects in the U.S. anticipated to be completed in the Summer of 2024.[318]

Reliability

As detailed above, billions of dollars from federal and state governments, utilities, and charging companies are being invested to support the build-out of a national public charging network. At the start of 2023, 140,000 public EV charging ports had been deployed, and, if estimates are correct, that figure should triple by 2030.[319] To alleviate range anxiety and encouraging EV adoption across a diverse set of customers, chargers need to be deployed in record numbers and they need to be reliable. According to a 2024 Harvard Business School Report, "charging stations in the U.S. have an average reliability score of only 78%." [320] The same report indicates that poor charger maintenance resulting from a lack of consensus over who is responsible for the charger once it is installed leads to a variety of problems at the port,[321] including station connectivity challenges, hardware and software faults, broken charging connectors or cables, faulty credit card readers, and broken display screens.[322] These findings are echoed in a 2023 J.D. Power report, which found that 20.8% of surveyed customers experienced charging failures or equipment malfunctions that made it impossible to charge their EV.[323]

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[316] Michigan Economic Development Corporation. "Gov. Whitmer Announces Partnership with Adopt a Charger, Rivian to Install Electric Vehicle Chargers in Michigan State Parks." May 2022. Available at https://www.michiganbusiness.org/press-releases/2022/05/whitmer-announces-partnership-with-adopt-a-charger-rivian-install-electric-vehicle-chargers-in-michigan-state-parks/.

[317] General Motors. "Seven Automakers Unite to Create a Leading High-Powered Charging Network Across North America." 2023. Available at https://news.gm.com/newsroom.detail.html/Pages/news/us/en/2023/jul/0726-seven.html.

[318] *Ibid.*

[319] St. John, J. "EV chargers have a big reliability problem. Can the government fix it?" *Canary Media.* December 2023. Available at https://www.canarymedia.com/articles/ev-charging/ev-chargers-have-a-big-reliability-problem-can-the-government-fix-it.

[320] DeLollis, B. and G. Justice. Harvard Business School: Institute for Business in Global Society. "The state of EV charging in America: Harvard research shows chargers 78% reliable and pricing like the 'Wild West'." June 2024. Available at https://www.hbs.edu/bigs/the-state-of-ev-charging-in-america.

[321] *Ibid.*

[322] Voelker, J. "What makes EV charging stations fail?" *Car and Driver.* September 2023. Available at https://www.caranddriver.com/news/a45309960/ev-charging-stations-problems/.

[323] J.D. Power. "EV Leasing Volumes Poised to Surge as Tax Rule Makes It Cheaper to Lease than Buy." May 2023. Available at https://www.jdpower.com/business/resources/ev-leasing-volumes-poised-surge-tax-rule-makes-it-cheaper-lease-buy.

RECOMMENDATION

Align EVSE reliability standards among utility programs, state grant programs, and local funding programs to follow the NEVI guidance related to uptime.

To address these challenges, in 2023, the FHWA announced a new reliability standard for all NEVI-funded EVSE installations.[324] According to this standard, "a charging port is considered 'up' when its hardware and software are both online and available for use, or in use, and the charging port successfully dispenses electricity in accordance with requirements for minimum power level."[325] In its final rule, the FHWA required that each charging port must have an average annual uptime of more than 97%[326] and defines a number of outage reasons out of the operator's control[327] that should not be considered in the calculation.[328] Additionally, NEVI funding recipients are also required to submit a one-time, quarterly, annual report that highlights key data for evaluating uptime, utilization rates, and costs.[329]

While these measures are certainly critical to improving EVSE uptime for public charging infrastructure, concerns around enforcement and implementation of new technologies, such as cardless payment methods, remain.[330] Nevertheless, to ensure that all parties are operating under the same set of rules, it is important that standards are consistent across all entities that offer funding for EVSE installations.

Public Charging Use Cases

EV drivers will need convenient, affordable charging options for a variety of use cases including but not limited to overnight charging near home, topping up while running errands, and fast charging on a road trip. Each of these use cases involves a different set of stakeholders and considerations. Two of the most critical use cases for stakeholders to consider in Michigan are curbside charging and retail locations, both of which are essential for the equitable deployment of public charging infrastructure and thus EV adoption.

On-street and curbside charging

Home charging is the most cost-effective and convenient charging solution available to drivers. And yet, a 2021 National Renewable Energy Laboratory (NREL) study found that 40% of drivers without access to at-home charging live in MFH, and that low- and mid-capacity apartment complexes have the lowest charging access – 10% and 8% respectively.[331] As discussed in *Section 4.1*, this means that MFH residents, who are more likely to be part of a minority community, face many obstacles to EV ownership. Access to affordable, convenient public charging, including less expensive Level 2 public

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[324] The White House. "FACT SHEET: Biden- Harris Administration Announces New Standards and Major Progress for a Made-in-America National Network of Electric Vehicle Chargers." February 2023. Available at https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/.

[325] U.S. Department of Transportation. Federal Highway Administration. "Docket No. FHWA-2022-0008: National Electric Vehicle Infrastructure Standards and Requirements." §680.116. Vol. 88, No. 39. February 2023. Available at https://www.govinfo.gov/content/pkg/FR-2023-02-28/pdf/2023-03500.pdf.

[326] Uptime is calculated using the following equation: μ = ((525,600−(T_outage−T_excluded))/525,600) × 100, where: μ is the port uptime percentage, T_outage is the total number of minutes of outage in the previous year, and T_excluded is the total number of outage minutes out of the operator's control.

[327] To be excluded from the uptime calculation, the charging station operator must adequately exhibit that the operator is not at fault for the failure. These include utility service interruptions, vehicle failure, scheduled maintenance, vandalism, or force majeure.

[328] U.S. Department of Transportation. Federal Highway Administration. "Docket No. FHWA-2022-0008: National Electric Vehicle Infrastructure Standards and Requirements." §680.116. Vol. 88, No. 39. February 2023. Available at https://www.govinfo.gov/content/pkg/FR-2023-02-28/pdf/2023-03500.pdf.

[329] *Ibid.*

[330] St. John, J. "EV chargers have a big reliability problem. Can the government fix it?" *Canary Media.* December 2023. Available at https://www.canarymedia.com/articles/ev-charging/ev-chargers-have-a-big-reliability-problem-can-the-government-fix-it.

[331] Ge, Y., *et al.* National Renewable Energy Laboratory. "There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure." October 2021. Available at https://www.nrel.gov/docs/fy22osti/81065.pdf.

charging near MFH properties, is critical. Level 2 public charging costs ranges from $0.20 to $0.30 per kWh while DCFC public charging ranges from $0.34 to $0.43 per kWh.[332, 333] Thus, overdependence on public DCFC charging may exacerbate current inequities to cost-effective charging access.

To minimize disparities in access to home charging, Level 2 on-street or curbside charging can serve as an overnight charging solution that is more affordable than purely relying on publicly available DCFCs.[334] Not only does Level 2 curbside charging offer lower cost charging to residents, but the cost per port may be significantly less expensive than DCFCs depending on the deployment scenario.[335, 336, 337] Additionally, DCFC installations typically face higher labor and utility upgrade costs, and projects are sometimes delayed due to utility interconnection timelines. Alternatively, Level 2 curbside chargers require less power draw, thereby potentially reducing the need to upgrade distribution capacity at a given site as compared to DCFCs, and putting less strain on the EV driver, site host, and utility. In addition to providing an experience similar to at-home charging, curbside charging can also encourage local shopping, as discussed in *Section 4.3*.

Curbside charging can be installed on existing infrastructure, such as utility poles or streetlights, or on new infrastructure, and management of the charger often depends on who owns the infrastructure.[338] Three common types of installations exist: [339, 340]

- ***Pole-mounted chargers*:** A Level 2 charger is mounted to an existing utility pole, which is typically owned by the utility. Because pole-mounted chargers do not require the installation of additional infrastructure, they can save 55 – 70% on installation costs compared to pedestal-mounted chargers.[341]
- ***Streetlight-mounted chargers:*** A Level 2 charger is mounted to an existing streetlight, which is typically owned by the locality, though there are cases of co-ownership between the locality and the utility. Due to variation in voltage and capacity among streetlights across the U.S., costs depend on any required upgrades.
- ***Pedestal-mounted chargers:*** A Level 2 charger is mounted to a newly constructed pole or pedestal. These chargers can be placed wherever the need is greatest, thus making it the most flexible solution.

Regardless of the installation method, curbside charging pilot programs are gaining popularity nationwide, including in New York City,[342] Kansas City,[343] Boston,[344] and Los Angeles.[345, 346] In Michigan, a few pilot programs exist that support curbside EV charging. For example, Consumers Energy currently has an additional incentive for "Level 2 chargers, plug outlets, and

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[332] Bullis, C. "There's no place like home (to charge your EV)." *FLO Insights*. September 2022. Available at https://www.flo.com/insights/theres-no-place-like-home-to-charge-your-ev/.

[333] Clarke, W. "How much does it cost to charge an electric car?" *U.S. News & World Report.* January 2024. Available at https://cars.usnews.com/cars-trucks/advice/electric-car-charging-costs.

[334] California Energy Commission. "Zero-Emission Vehicle Infrastructure Plan (ZIP): Revised Staff Report." CEC-600-2022-054-REV. December 2022. Available at https://www.energy.ca.gov/sites/default/files/2022-12/600-2022-054-REV.pdf.

[335] Nelder, C. and E. Rogers. RMI. "Reducing EV Charging Infrastructure Costs." 2019. Available at https://rmi.org/wp-content/uploads/2020/01/RMI-EV-Charging-Infrastructure-Costs.pdf.

[336] Bullis, C. "How curbside chargers provide a 'home-adjacent' experience." *FLO Insights.* October 2022. Available at https://www.flo.com/en-ca/insights/curbside-charging-supporting-equitable-ev-adoption/.

[337] Nelder, C. and E. Rogers. RMI. "Reducing EV Charging Infrastructure Costs." 2019. Available at https://rmi.org/wp-content/uploads/2020/01/RMI-EV-Charging-Infrastructure-Costs.pdf.

[338] Werthmann, E. and V. Kothari. World Resources Institute. "Pole-mounted Electric Vehicle Charging: Preliminary Guidance for a Low-Cost and More Accessible Public Charging Solution for U.S. Cities." November 2021. Available at https://files.wri.org/d8/s3fs-public/2021-11/pole-mounted-electric-vehicle-charging-preliminary-guidance.pdf?VersionId=xNjP5je_Ohc5WnFVVCbxWGmmk_vMlqpu.

[339] *Ibid.*

[340] Bullis, C. "Choosing and deploying the curbside charger that is 'just right': The Goldilocks Endeavor." *FLO Insights*. November 2022. Available at https://www.flo.com/en-ca/insights/choosing-and-deploying-the-curbside-charger-that-is-just-right-the-goldilocks-endeavor/.

[341] Werthmann, E. and V. Kothari. World Resources Institute. "Pole-mounted Electric Vehicle Charging: Preliminary Guidance for a Low-Cost and More Accessible Public Charging Solution for U.S. Cities." November 2021. Available at https://files.wri.org/d8/s3fs-public/2021-11/pole-mounted-electric-vehicle-charging-preliminary-guidance.pdf?VersionId=xNjP5je_Ohc5WnFVVCbxWGmmk_vMlqpu.

[342] New York City Department of Transportation. "Electric Vehicles." Accessed August 2024. Available at https://www.nyc.gov/html/dot/html/motorist/electric-vehicles.shtml#/find/nearest.

[343] Rainey, B. "Everything you need to know about electric vehicle charging in Kansas City." July 2023. Available at https://kctoday.6amcity.com/city/everything-you-need-to-know-about-electric-vehicle-charging-in-kansas-city.

[344] City of Boston. "Curbside EV Charging." June 2024. Accessed August 2024. Available at https://www.boston.gov/departments/transportation/curbside-ev-charging#:~:text=The%20City%20is%20installing%20electric,ports%20available%20to%20the%20public.

[345] FLO Services. "FLO provides EV charging stations as part of a CEC BESTFIT-funded pilot program in Los Angeles metro area." September 2021. Available at https://www.flo.com/news/flo-provides-ev-charging-stations-as-part-of-a-cec-bestfit-funded-pilot-program-in-los-angeles-metro-area/.

[346] Werthmann, E. and V. Kothari. World Resources Institute. "Pole-mounted Electric Vehicle Charging: Preliminary Guidance for a Low-Cost and More Accessible Public Charging Solution for U.S. Cities." November 2021. Available at https://files.wri.org/d8/s3fs-public/2021-11/pole-mounted-electric-vehicle-charging-preliminary-guidance.pdf?VersionId=xNjP5je_Ohc5WnFVVCbxWGmmk_vMlqpu.

other potential charging options at curbside locations."[347] Additionally, in 2023 and in partnership with DTE and FLO, the Ann Arbor Office of Sustainability and Innovations celebrated the installation of the first utility pole-mounted public networked curbside chargers in the state of Michigan.[348] Placed near several MFH buildings, the Ann Arbor project will improve public charging access among MFH residents and the general public, as well as allow for data collection to assess utilization rate and consumer behavior.[349]

CASE STUDY

In 2021, New York City's Department of Transportation partnered with Con Edison and FLO to expand public EV charging access.[350] This resulted in the installation of 100 Level 2 curbside charging ports for public use across the city's five boroughs.[351, 352] Unlike parking garages with charging available that can cost $25 just for admission, the street spots charge $2.50 per hour during the day, and $1.00 per hour at night.[353]

Setting lower flat session rates for overnight charging encourages residents without at-home charging to shift their charging behavior to off-peak hours, similar to a TOU rate (see Section 6.4).[354] A flat overnight rate also prevents drivers from having to unplug their vehicle in the middle of the night. This minimizes disparities between at-home and public charging opportunities.

Since the pilot program began in New York, demand for spaces near the curbside chargers has boomed, with the entire system utilization rate reaching 72% in 2024.[355, 356] As the city looks to expand the program, it will aim to focus on neighborhoods with a high number of taxi and TNC drivers, fewer off-street parking options, and a wider diversity of resident income levels.[357]

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[347] Michigan Public Service Commission Order. "Docket U-21224: In the Matter of the Application of Consumers Energy Company for Authority to Increase its Rates for the Generation and Distribution of Electricity and for Other Relief." January 19, 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000006KyFqAAK.

[348] City of Ann Arbor. "Ann Arbor to Unveil Innovative Curbside Electric Vehicle Chargers at Nov. 16 Event." November 2023. Available at https://www.a2gov.org/news/pages/article.aspx?i=1012.

[349] *Ibid.*

[350] New York City Department of Transportation. "Electric Vehicles." Accessed August 2024. Available at https://www.nyc.gov/html/dot/html/motorist/electric-vehicles.shtml#/find/nearest.

[351] *Ibid.*

[352] FLO. "Curbside Charging: New York City Public Charging." Accessed August 2024. Available at https://www.flo.com/new-york-city/.

[353] Hanley, S. "Curbside Charging in NYC is a Huge Success." *CleanTechnica.* March 2024. Available at https://cleantechnica.com/2024/03/29/curbside-ev-charging-in-nyc-is-a-huge-success/.

[354] Bullis, C. "Public EV charging stations: How cities can promote curbside charging." *FLO Insights.* January 2023. Available at https://www.flo.com/insights/type/article/how-cities-can-promote-curbside-charging/.

[355] *Ibid.*

[356] Alake, T. "NYC's Curbside EV Charger are Popular – and Often Blocked." *Bloomberg.* March 2024. Available at https://www.bloomberg.com/news/articles/2024-03-27/nyc-s-level-2-curbside-ev-charging-pilot-extended-past-2024.

[357] *Ibid.*

RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

RECOMMENDATION

Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.

Curbside charging represents a critical opportunity to ensure the equitable deployment of charging infrastructure, particularly in more urban areas. As such, utilities and localities should prioritize the deployment of curbside charging infrastructure. However, it is not without its obstacles. For example, in urban areas where street parking is limited, ICE vehicles often block EV parking spaces.[358] In 2023, the New York Police Department issued nearly 2,200 summons for parking violators using "EV charging only" parking spots.[359] Localities installing curbside charging should plan appropriately for parking regulation enforcement (see Section 4.1). To ensure program success, localities can also take several steps to better prepare for curbside charging through proactive planning and streamlining the zoning ordinances and permitting process, such as:

- As discussed in Section 4.1, setting deployment goals can help create alignment across local units of government and agencies. Not only does this encourage different stakeholders to work together toward the common goal, but it helps encourage the development of deployment plans and the incorporation of those goals into zoning and permitting considerations.
- Like utility hosting capacity maps (see Section 4.1), identifying sites and existing infrastructure that have the greatest potential for hosting curbside charging can help local stakeholders reduce uncertainty and effectively plan for curbside charger deployment.[360] For example, the City of Sacramento[361] has a publicly available "curbside ready" map that shows anticipated and potential curbside charging opportunities throughout the city. Curbside capacity maps should be updated regularly.
- As discussed in Section 4.1, local AHJs should standardize guidance and requirements for curbside charging deployments, and publish online clear information pertaining to application requirements as well as typical timelines for the permit review process.[362] For example, the District of Columbia's Department of Transportation clearly outlines the requirements to engage in its "Electric Vehicle Curbside Charging Station Program," as well as guidelines on

[358] *Ibid.*

[359] Hanley, S. "Curbside Charging in NYC is a Huge Success." *CleanTechnica.* March 2024. Available at https://cleantechnica.com/2024/03/29/curbside-ev-charging-in-nyc-is-a-huge-success/.

[360] Bullis, C. "Public EV charging stations: How cities can promote curbside charging." *FLO Insights.* January 2023. Available at https://www.flo.com/insights/type/article/how-cities-can-promote-curbside-charging/.

[361] City of Sacramento, Department for Public Works. "Streets with Potential for Curbside Charging." November 2018. Available at https://www.cityofsacramento.org/-/media/Corporate/Files/Public-Works/Electric-Vehicles/MAP-CurbsideChargerPotential120318.pdf?la=en.

[362] Bullis, C. "Public EV charging stations: How cities can promote curbside charging." *FLO Insights.* January 2023. Available at https://www.flo.com/insights/type/article/how-cities-can-promote-curbside-charging/.

covering cords crossing the public right-of-way.[363] Similarly, California developed an EVSE Permitting Guidebook[364] and model checklists to help inform local AHJs permitting process,[365] and also requires local AHJs to respond to permit applications within five days of submission.[366]

Commercial Operators

Commercial operators are any retailer or business serving as an EVSE site host. A study conducted by NREL suggests that to meet public charging demand spurred by increased EV adoption, these commercial operators will need to account for 16.68% of public charging by 2030, which will require the installation of 178,000 Level 2 chargers and 30,000 DCFC.[367] Retailers can take advantage of several benefits and resources to help offset the cost of EVSE installations:

- As discussed, the 2021 IIJA authorized $7.5 billion in federal spending on EV charging infrastructure with $5 billion allocated to the NEVI Formula Program and $2.5 billion to the Charging and Fueling Infrastructure Grant Program.
- The 2022 IRA extended the Alternative Fuel Vehicle Refueling Property Credit through 2032, which can cover up to 30% of the cost of installing EVSE, or up to $100,000 per charger, for qualifying retail locations. The tax credit is limited to charger installations in specific census tracts that are identified as either non-urban or low-income.

Retailers can also benefit by making these investments. According to a study from the Boston University Questrom School of Business, following the installation of a nearby fast charger, retailers see a 4% increase in foot traffic and 5% increase in revenue as customers run errands while their vehicle charges.[368] In fact, 89% of EV drivers make retail purchases while charging.[369]

CASE STUDY

In the grocery sector, Grand Rapids, Michigan-based Meijer has EVSE installed at over 20% of its locations, including its headquarters and distribution centers.[370] The roll-out of EVSE installations, ranging from 100 to 350 kW, began in 2010 and has only continued to expand through partnerships with various service providers, such as EVGo, Tesla, and Electrify America. In December 2023, Meijer announced an expanded partnership with EVGo to install more fast charging, high-power 350 kW EVSE at select locations.[371]

CASE STUDY

Wisconsin-based Kohl's has also made significant EV infrastructure investments - there are now 275 stations at more than 150 store locations across 22 states.[372] Kohl's has indicated that the financial benefits are clear, claiming that customers spend approximately 50 minutes longer at a store and $1 for every minute of charging in a Kohl's parking lot.[373]

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[363] District of Columbia, Department of Transportation. "Electric Vehicle Charging Station Program." Accessed August 2024. Available at https://ddot.dc.gov/es/node/1590091.

[364] California Governor's Office of Business and Economic Development. "Electric Vehicle Charging Station Permitting Guidebook." 2nd ed. January 2023. Available at https://business.ca.gov/wp-content/uploads/2019/12/GoBIZ-EVCharging-Guidebook.pdf.

[365] California Governor's Office of Business and Economic Development. "Permitting Electric Vehicle Charging Stations: Best Practices." Accessed August 2024. Available at https://business.ca.gov/industries/zero-emission-vehicles/plug-in-readiness/permitting-electric-vehicle-charging-stations-best-practices/.

[366] California Legislature. California Assembly Bill No. 970. "Planning and Zoning: Electric Vehicle Charging Stations." October 2021. Available at https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB970.

[367] Wood, E., *et al.* National Renewable Energy Laboratory. "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure." 2023. https://www.nrel.gov/docs/fy23osti/85654.pdf.

[368] Babar, Y. and G. Burtch. Boston University Questrom School of Business. "Recharging Retail: Estimating Consumer Demand Spillovers from Electric Vehicle Charging Stations." Research Paper No. 4235748. October 2022. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4235748.

[369] Blink Charging. "Attract and Retain High-Value Shoppers." Accessed June 2024. Available at https://blinkcharging.com/host-a-station/retail.

[370] Meijer. "Electric Vehicle Charging." Accessed June 2024. Available at https://meijercommunity.com/ev-charging.

[371] Lovrak, T. "EVgo, Meijer Expand Fast Charging Partnership Through EVgo eXtend." *EV Design & Manufacturing.* December 2023. Available at https://www.evdesignandmanufacturing.com/news/evgo-meijer-charging-infrastructure-partnership/.

[372] Kohl's. "Kohl's to Expand Electric Vehicle Charging Stations for Additional Customer Convenience in Support of Sustainability Goals." April 2021. Available at https://corporate.kohls.com/news/archive-/2021/april/kohl-s-to-expand-electric-vehicle-charging-stations-for-addition.

[373] Babar, Y. and G. Burtch. Boston University Questrom School of Business. "Recharging Retail: Estimating Consumer Demand Spillovers from Electric Vehicle Charging Stations." Research Paper No. 4235748. October 2022. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4235748.

As in the cases of MFH and workplace charging, commercial operators can lease or own EVSE equipment. Assuming the commercial operator owns the EVSE, the pricing structure for charging typically takes one of three forms: [374]

- *No fee:* Charging is provided as an amenity to customers at no extra cost.
- *Nominal fee:* Charging is provided at costs only high enough to recoup operations and installation costs, and to protect the EVSE owner from increased operational costs.
- *Higher cost:* Charging is provided at a higher cost to recoup operations and installation costs, protect the EVSE from increased operational costs, and earn additional revenue.

RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

RECOMMENDATION

Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.

According to Atlas Public Policy, charging fees account for approximately 8% of the nominal profit attributed to an EVSE installation, which can be further bolstered by user fees and advertising revenue.[375] The same report suggests that the average in-store customer revenue per minute can help commercial operators determine which fee structure can help achieve longer dwell times while also generating sufficient customer turnover.[376] In fact, the same study found that the average charging station net present value (NPV) was five times greater for an in-store dwell time of 25 to 50 minutes than that realized by a 50 to 75 minute dwell time, suggesting that the benefit of offering charging tapers off if the dwell time was too high.[377] Naturally, this depends on the business type as well. For those commercial sites that typically have lower average spend per customer, that site owner should choose the appropriate EVSE and fee structure to achieve higher customer turnover.[378] Regardless, including the revenue increase attributed to longer customer dwell times in assessing project value over time has a significant effect on the owner-operator's evaluation of the EVSE's NPV. A 2019 report by the

[374] Satterfield, C. and N. Nigro. Atlas Public Policy. "Public EV Charging Business Models for Retail Site Hosts." April 2020. Available at https://atlaspolicy.com/wp-content/uploads/2020/04/Public-EV-Charging-Business-Models-for-Retail-Site-Hosts.pdf.

[375] *Ibid.*

[376] *Ibid.*

[377] *Ibid.*

[378] *Ibid.*

New York State Energy Research and Development Authority found that including non-charging retail revenue in the NPV analysis allowed for 48% of projects to achieve profitability, compared to only 35% when non-charging retail revenue was not included.[379]

Despite these benefits, an investigation by Consumer Reports suggests that only 1% of retail locations nationwide offer any EV charging.[380] The same study found that on average, EV charging is available at about 7% of big box store locations, 7% of grocery store locations, and less than 3% of department stores. For these commercial locations to meet demand and account for nearly 17% of public charging by 2030, they will need to triple the number of currently available chargers in the next six years. The pathway to installing EVSE at retail locations can be complicated. Retailers often cite a variety of challenges, such as:[381, 382]

- Tight margins, especially without incentives provided by partnerships with local utilities and EVSPs;
- Roadblocks due to zoning and permitting, leading to significant project delays;
- Trouble understanding different types of EVSE and aligning customer dwell time with charging time, often referred to as "right speeding" or "right sizing";
- Difficulty coordinating with local utilities to increase electrical capacity, contending with demand charges, and negotiating fair tariffs, which often requires setting chargers up on separate meters; and
- Misalignment with property owners or neighboring businesses if the retailer is leasing the space, as in a strip mall.

For example, if it is necessary to cross or conduct work on land owned by a third party to upgrade electrical infrastructure to serve the EV charging load or connect the EVSE to the grid, it may be necessary to obtain a utility easement.[383] A utility easement "outlines the utility company's right to access and control the portion of land that is located near utility facilities and structures (i.e., utility poles, transformers, overhead or underground electrical lines) so the utility can ensure the equipment is working properly."[384] As such, site selection and utility coordination can have a significant impact on the timeline of EVSE installation and energization.[385] Depending on the circumstances, obtaining utility easements can be challenging. Failure to address property ownership and easement issues in the initial planning phases of the project can lead to an increase in unforeseen costs, longer project timelines, and even project abandonment.[386, 387] Consequently, these factors may deter prospective site hosts from pursuing EVSE projects or applying for critical grant applications to expand public charging infrastructure. Several steps can be taken to address these issues:

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[379] Nigro, N., *et al.* New York State Energy Research and Development Authority. "Assessing the Business Case for Hosting Electric Vehicle Charging Stations in New York State." June 2019. Available at https://atlaspolicy.com/wp-content/uploads/2019/09/19-31-Business-Case-for-Hosting-Charging-Stations.pdf.

[380] Toher, D. "Charging the Future: The Role of Retail in Our EV Transition." *Consumer Reports*. March 2024. Available at https://advocacy.consumerreports.org/wp-content/uploads/2024/02/ChargingTheFuture_final.pdf.

[381] *Ibid.*

[382] Dworski, D. "C-store retailers reveal costs and surprises of EV charging." *C-Store Dive.* April 2023. Available at https://www.cstoredive.com/news/ev-charging-c-store-retailers-offer-perspective/647399/.

[383] Lozanova, S. "Easements Interconnection & Underground Surveys for EVC Stations." *Greenlancer.* June 2024. Available at https://www.greenlancer.com/post/utility-easements-for-ev-charging-stations.

[384] EVgo Services LLC. "Demystifying Utility Easements for EV Charging Stations." January 2021. Available at https://www.evgo.com/blog/demystifying-utility-easements/.

[385] Rosser, A., *et al.* National Association of State Energy Officials (NASEO), American Association of State Highway and Transportation Officials, and Atlas Public Policy. "Advancing NEVI: Recommendations from State NEVI Funding Applicants." July 2024. Available at https://www.naseo.org/data/sites/1/documents/publications/NEVI%20State%20Funding%20Applicants_v4.pdf.

[386] Lozanova, S. "Easements Interconnection & Underground Surveys for EVC Stations." *Greenlancer.* June 2024. Available at https://www.greenlancer.com/post/utility-easements-for-ev-charging-stations.

[387] EVgo Services LLC. "Best Practices for Charging Infrastructure Program Design: Utilities." July 2022. Available at https://site-assets.evgo.com/f/78437/x/dfe30bb392/071122_best-practices_utilities.pdf.

- ***Allow longer application periods for state funding programs:*** For Round 2 of NEVI funding, MDOT is requiring project proposal submissions within 60 days of the Request for Proposals issue date.[388] Short application periods leave prospective applicants little time to coordinate with the utilities and effectively estimate project costs. Additionally, as NEVI project implementation ramps up and the volume of requests increases, utilities may find it difficult to accurately address proposals within the application window.[389] If the site host requires utility assistance in project design, for example, this process can take 4-5 weeks alone, which is more than half the allotted NEVI Round 2 proposal window in Michigan. Thus, limiting the time to adequately review plans or coordinate with utilities may unintentionally lead to more speculative applications that cannot ultimately be completed because site hosts were unaware of critical project considerations prior to submitting the proposal. This may frustrate awardees and non-awardees alike, as well as lead to hesitation to participate among future applicants.

- ***Improve access to information***: As of 2021, nine states – California, Colorado, Connecticut, Illinois, Maryland, Minnesota, Nevada, New Jersey, and New York – require utilities to provide hosting capacity maps.[390] As discussed in *Section 4.1*, utility hosting capacity maps can help site hosts effectively plan projects, assess available capacity to accommodate new DERs, and estimate project costs.[391, 392] Similarly, utilities should ensure that easement language and requirements are available to the public.[393] Providing applicants with sufficient information to understand what will be required to complete the project will increase the likelihood of project success.

RECOMMENDATION

Require Michigan's utilities to provide up-to-date publicly available bidirectional hosting capacity maps to provide sufficient detail to allow right-sizing of installed EV chargers and installation of EV chargers in locations with sufficient distribution infrastructure.

[388] Michigan Department of Transportation. "National Electric Vehicle Infrastructure (DBOM) - Round 2." Accessed August 2024. Available at https://www.michigan.gov/mdot/business/contractors/innovativecontracting/national-electric-vehicle-infrastructure-2.

[389] Rosser, A., *et al.* National Association of State Energy Officials (NASEO), American Association of State Highway and Transportation Officials, and Atlas Public Policy. "Advancing NEVI: Recommendations from State NEVI Funding Applicants." July 2024. Available at https://www.naseo.org/data/sites/1/documents/publications/NEVI%20State%20Funding%20Applicants_v4.pdf.

[390] Driscoll, W. "IREC guide aims to help states deploy solar hosting capacity maps." *PV Magazine USA.* September 2021. Available at https://pv-magazine-usa.com/2021/09/20/irec-guide-aims-to-help-states-deploy-solar-hosting-capacity-maps/.

[391] U.S. Department of Energy. Office of Energy Efficiency and Renewable Energy. "U.S. Atlas of Electric Distribution System Hosting Capacity Maps." Accessed August 2024. Available at https://www.energy.gov/eere/us-atlas-electric-distribution-system-hosting-capacity-maps.

[392] EVgo Services LLC. "Best Practices for Charging Infrastructure Program Design: Utilities." July 2022. Available at https://site-assets.evgo.com/f/78437/x/dfe30bb392/071122_best-practices_utilities.pdf.

[393] Rosser, A., *et al.* National Association of State Energy Officials (NASEO), American Association of State Highway and Transportation Officials, and Atlas Public Policy. "Advancing NEVI: Recommendations from State NEVI Funding Applicants." July 2024. Available at https://www.naseo.org/data/sites/1/documents/publications/NEVI%20State%20Funding%20Applicants_v4.pdf.

- ***Allow adequate inventory of essential utility equipment:*** Currently, most utility equipment purchases are "made to order," however, lead times on utility equipment, such as transformers, can take 20 weeks or more, thus increasing the project timeline.[394] Allowing utilities to make investments in essential equipment in advance to build some on-hand inventory can help keep projects on track as part of an approved long-term transportation electrification plan (see *Section 6.5*).

RECOMMENDATION

Encourage utilities to conduct EV load forecasting in a granular manner that allows for "no regrets" investments to mitigate grid constraints at anticipated congestion points.

To overcome these obstacles, commercial operators can and should collaborate with EVSPs to assess their business needs. Several EVSPs have consulting services to perform this very function. To further ease this process, it is important that private companies with the expertise in navigating communication with local utilities, contractors, and AHJs can apply for rebates on behalf of the customer. Commercial operators can also access trained contractor networks, who have expertise in EVSE installation, as discussed in *Section 3.3*. Consulting and coordinating with field experts can help ensure that applications are filed correctly and inspections occur in a timely manner. Education and targeted, consistent communication that helps commercial operators better understand the needs of their businesses, the costs, and different incentive programs is also of the utmost importance.

Section 4.4: Workplace Charging

Much of the conversation around public charging infrastructure is devoted to fully public settings - shopping centers, gas stations, public parks, etc. However, semi-public charging is another important opportunity to improve charging access. Semi-public charging refers to settings in which the charging is widely available to a specific group of people. The most common example of this is workplace charging made available to a company's own workforce. In a CBRE report, the number of active workplace charging ports reported by one EVSP increased by 22% year-over-year in 2023.[395] Even with the increase in remote work since the start of the COVID-19 global pandemic, a Harvard Business Review study found that 75% of Americans still commute to work every day.[396] In 2023 it was reported that, with the number of unique EV drivers taking advantage of workplace charging increasing by 57%,[397] nearly 50% of EV drivers with access to workplace charging use it daily or weekly.[398] Demand for workplace charging, like public charging, is outpacing supply.[399]

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[394] EVgo Services LLC. "Best Practices for Charging Infrastructure Program Design: Utilities." July 2022. Available at https://site-assets.evgo.com/f/78437/x/dfe30bb392/071122_best-practices_utilities.pdf.

[395] CBRE. "EV Adoption Creates More Demand for Workplace Charging Stations." May 2024. Available at https://www.cbre.com/insights/articles/ev-adoption-creates-more-demand-for-workplace-charging-stations.

[396] Bailey, J. and A. Cohen. "That 'Dreaded' Commute is Actually Good for Your Health." *Harvard Business Review.* May 2021. Available at https://hbr.org/2021/05/that-dreaded-commute-is-actually-good-for-your-health.

[397] CBRE. "EV Adoption Creates More Demand for Workplace Charging Stations." May 2024. Available at https://www.cbre.com/insights/articles/ev-adoption-creates-more-demand-for-workplace-charging-stations.

[398] Plug In America. "2023 EV Driver Survey: A Strong Year for EVs, but Charging Reliability Needs Improvement." 2023. Available at https://pluginamerica.org/wp-content/uploads/2023/05/2023-EV-Survey-Final.pdf.

[399] CBRE. "EV Adoption Creates More Demand for Workplace Charging Stations." May 2024. Available at https://www.cbre.com/insights/articles/ev-adoption-creates-more-demand-for-workplace-charging-stations.

Although on average, employees are only driving 16 miles each way, employees with long commutes or without access to overnight charging at home may be hesitant to purchase an EV without confirmation that they can charge in another convenient way. A 2016 report by the U.S. DOE suggests that employees who can charge at work are six times more likely to purchase an EV.[400]

There is also evidence that projects like establishing workplace charging, which support a business's Environmental, Social, and Governance (ESG) goals, make the business more attractive to job applicants and improve retention. In a 2021 Gallup poll, 69% of U.S. workers said that a company's environmental record would factor into their decision to accept a position there.[401] Based on the U.S. average mix of fuels that power the grid, providing EV charging to employees could significantly reduce the emissions impact of employee commuting.[402] Employers that provide workplace charging signal a commitment not only to the business's employees, but to its ESG goals as well. Organizations that provide workplace EV charging are eligible for several certifications:

- The Electric Vehicle Adoption Leadership (EVAL) Certification[403] is a U.S. DOE-funded program managed by Forth Mobility,[404] a nonprofit organization dedicated to increasing equitable access to electric transportation. The national workplace charging certification program provides recognition to employers that encourage clean transportation and provide access to EV charging for employees.
- Charging stations can yield credit toward green building certifications, such as the Leadership in Energy and Environmental Design (LEED) certification, which uses a tiered rating system to assess environmentally friendly building practices.[405] Building owners can gain LEED certification points by installing EVSE or EV-R infrastructure.[406] The U.S. Green Building Council encourages states to develop incentives, such as tax credits, that are linked to energy savings achieved.[407]

Unique Challenges to Workplace Charging

Despite these benefits, a general lack of familiarity with EV charging and what it could mean for the business can create barriers to adoption. Local and state governments can provide education to help bridge these gaps. For example, the City of Boston's "How-To Guide: Starting a Workplace Electric Vehicle Charging Program" provides additional information about planning and managing workplace charging.[408] To gauge the expected use of any installed EVSE, employers can distribute a survey to employees.[409] Sharing these results and engaging with the local utility and an EVSP can help business owners better right-speed the proposed EVSE installation and more effectively assess the associated costs.[410] In addition to stakeholder engagement, employers have several business decisions to consider throughout the process:

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[400] U.S. Department of Energy. "Workplace Charging Challenge: Progress Update 2016: A New Sustainable Commute." 2016. Available at https://www.energy.gov/eere/vehicles/articles/workplace-charging-challenge-2016-progress-update.

[401] McCarthy, J. "Environmental Record a Factor for Most U.S. Job Seekers." Gallup. April 2021. Available at https://news.gallup.com/poll/346619/environmental-record-factor-job-seekers.aspx.

[402] Brown, A. U.S. Department of Energy. "Workplace Charging: Comparison of Sustainable Commuting Options." November 2014. Available at https://afdc.energy.gov/files/u/publication/Session1B_Brown.pdf.

[403] Forth Mobility. "Electric Vehicle Adoption Leadership Certification." Accessed June 2024. Available at https://www.evalcertification.org/.

[404] Forth Mobility. "Forth: Advancing Clean and Equitable Transportation." Accessed June 2024. Available at https://forthmobility.org/.

[405] U.S. Green Building Council. "LEED rating system." Accessed June 2024. Available at https://www.usgbc.org/leed.

[406] Blink Charging. "LEED Certification and EV Charging Stations: What You Need to Know." September 2022. Available at https://blinkcharging.com/blog/leed-certification-and-ev-charging-stations-what-you-need-to-know.

[407] U.S. Green Building Council. "Encouraging Building Energy Improvements Through Tax Incentives." November 2015. Available at https://www.usgbc.org/sites/default/files/Encouraging%20Building%20Energy%20Improvements%20Through%20Tax%20Incentives.pdf.

[408] City of Boston Transportation. "How-to Guide: Starting an Electric Vehicle Workplace Charging Program." Accessed June 2024. Available at https://www.boston.gov/sites/default/files/file/2020/03/1527-03%20-%20Workplace%20Charging.pdf.

[409] U.S. Department of Energy. "Workplace Charging Challenge: Sample Employee Survey for Workplace Charging Planning." Accessed June 2024. Available at https://afdc.energy.gov/files/u/publication/WPCC_sample_employee_survey_0816.pdf.

[410] U.S. Department of Energy. Alternative Fuels Data Center. "Workplace Charging for Electric Vehicles." Accessed June 2024. Available at https://afdc.energy.gov/fuels/electricity-charging-workplace.

- ***The appropriate ownership model:*** According to a report released by the EMPOWER Workplace Charging Project, the EVSE ownership model for workplace charging typically takes two forms:[411]
  - *EVSE Owner:* The business purchases the EVSE and pays for the installation outright, providing the most control of revenue and equipment management. This may require the business to provide in-house O&M or contract the service out to a third party.
  - *Lease Agreements:* The business leases the EVSE from an EVSP, which may reduce initial upfront costs. Lease agreements typically include O&M costs.

- ***The pricing structure:*** Generally, employers offer charging for free, as another benefit to employees, or at a low cost, either at a flat rate or at a rate based on usage. CBRE, a commercial real estate services provider, issued a report stating that one EVSP indicated that 63% of its installed workplace chargers are offered as a free service to authorized users (i.e., employees).[412] Free charging may drive EV adoption, but if demand exceeds charger availability, it may have the opposite effect over time.[413] As utilization of chargers increases over time, the workplace could consider using pricing as tool to ensure adequate turnover and better manage demand. A workplace can also add more chargers over time as employee demand increases.

- ***The access:*** Employers can also open a workplace charging facility to the public after work hours. The benefits of opening the chargers up to the public include the opportunity to earn revenue from non-employee charging and to qualify for additional incentives. For example, Consumers Energy's PowerMIDrive program includes rebates for workplace charging. As shown in *Table 7* above, Consumers Energy offers a rebate of up to $7,500 for a 240V Level 2 workplace charger on a separately metered rate. If the workplace meets these qualifications and is within 3 blocks of an eligible MFH location, the workplace could also elect to serve as an overnight community charging location to qualify for an additional rebate of $10,000.[414] Programs like this can help further defray the initial upfront installation and equipment costs that might otherwise discourage employers from deploying workplace chargers.

- ***The right technology:*** As described above, the average commute to and from work is about 32 miles in a day.[415] A typical Level 2 charger will deliver approximately 25 miles of range per 1 hour of charging, which means that a vehicle plugged into a Level 2 for 8-hour workday will far exceed the need that the employee likely has to get home.[416] As such,

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[411] Columbia-Willamette Clean Cities Coalition. "Workplace Charging Barrier Study." June 2023. Available at https://www.cadeogroup.com/wp-content/uploads/2023/06/EMPOWER_Workplace-charging-barrier-study_FINAL_16JUN23_website-1.pdf.

[412] CBRE. "EV Adoption Creates More Demand for Workplace Charging Stations." May 2024. Available at https://www.cbre.com/insights/articles/ev-adoption-creates-more-demand-for-workplace-charging-stations.

[413] Saxton, T. Plug In America. "Workplace Charging - The Goldilocks Approach." January 2015. Available at https://pluginamerica.org/workplace-charging-goldilocks-approach/.

[414] Michigan Public Service Commission Order. "Docket U-21389: In the Matter of the Application of Consumers Energy Company for Authority to Increase its Rates for the Generation and Distribution of Electricity and for Other Relief." March 1, 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CGiDUAA1.

[415] Bailey, J. and A. Cohen. "That 'Dreaded' Commute is Actually Good for Your Health." *Harvard Business Review.* May 2021. Available at https://hbr.org/2021/05/that-dreaded-commute-is-actually-good-for-your-health.

[416] U.S. Department of Energy. Alternative Fuels Data Center. "Electric Vehicle Charging Stations." Accessed June 2024. Available at https://afdc.energy.gov/fuels/electricity-stations.

in some cases, Level 1 chargers may be adequate for workplace charging applications.[417] To accommodate those employees who have longer commutes or who do not have access to at-home charging, however, Plug In America suggests some Level 2 and even DCFC, be made available.[418]

RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

RECOMMENDATION

Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.

Connecting businesses with the right resources to navigate these questions and identify their unique needs is imperative to a successful and sustainable workplace charging program. For example, organizations like the EMPOWER Workplace Charging Project, in collaboration with Clean Cities Coalition chapters nationwide, including Michigan Clean Cities, help connect workplaces in LI communities to workplace charging opportunities by providing technical assistance and educating employers about the value of workplace charging.[419]

Section 4.5: Fleet Charging

The electrification of fleet vehicles presents a significant opportunity to reduce emissions, lower operational costs, and lead the charge toward a sustainable transportation future. Used to describe commercial or publicly owned and operated vehicles, 'fleets' is a broad term that encompasses a significant variety of vehicle types fulfilling various use-cases. Fleet vehicles, which include delivery vans, trucks, buses, service vehicles, and many more vehicle types, typically have predictable routes and centralized parking, making them ideal candidates for electrification. However, the successful implementation of EVSE for fleet vehicles requires careful planning and consideration of several factors to ensure operational efficiency and reliability.

Choosing the right location for a charging depot is a critical factor. While businesses with larger fleets and multiple vehicle depots across a geographic location may have an easier time selecting a site with the appropriate space and grid conditions to install EVSE, small businesses with fewer vehicles will likely have fewer choices regarding charging depot location. Either way, the site should have sufficient space to accommodate the fleet vehicles and the charging infrastructure. Proximity to the fleet's operational routes can minimize downtime and improve logistical efficiency.[420]

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[417] Saxena, S., *et al.* "Charging Ahead on the Transition to Electric Vehicles with Standard 120 V Wall Outlets." *Applied Energy.* June 2015. Available at https://ecal.studentorg.berkeley.edu/pubs/L1-Chargers.pdf.

[418] Saxton, T. Plug In America. "Workplace Charging - The Goldilocks Approach." January 2015. Available at https://pluginamerica.org/workplace-charging-goldilocks-approach/.

[419] EMPOWER Workplace Charging. "Driving EV-Friendly Workplaces." Accessed June 2024. Available at https://www.workplacecharging.com/.

[420] U.S. Department of Energy. Alternative Fuels Data Center. "Electric Vehicles for Fleets." Accessed June 2024. Available at https://afdc.energy.gov/vehicles/electric-fleets.

RECOMMENDATION

Require Michigan's utilities to provide up-to-date publicly available bidirectional hosting capacity maps to provide sufficient detail to allow right-sizing of installed EV chargers and installation of EV chargers in locations with sufficient distribution infrastructure.

Charging a large fleet of EVs can place a significant demand on the local electricity grid, potentially requiring upgrades to existing infrastructure. As such, the electric utility provider should be engaged in planning early in the process to ensure utility-side capacity to support fleet-customer needs. If possible, strain on the grid can be mitigated and EVSE installation for fleets can be expedited by encouraging fleet operators to select charging sites at locations where sufficient electrical capacity already exists. This collaboration helps ensure that the increased power demand can be met without causing disruptions or incurring excessive costs.

RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

To guide customers looking to install EVSE, DTE Energy provides an EV Hosting Capacity Map which shows portions of DTE service territory with the current electrical capacity to support the installation of new DCFC of varying power levels.[421] As fleet operators and depot managers look to install EVSE, using resources like this and early engagement with the utilities will streamline the installation process and expedite fleet transition to EVs. Still, to ensure that electric capacity is not a limiting factor for smaller fleets that are geographically constrained, utility companies should pursue proactive grid planning and investments to ensure they are able to meet the needs of the fleet operators in their service territory.

Fleet operators will need to decide what kind of charging infrastructure is best suited to meet the needs of their electrified fleet. Level 2 chargers have longer charge times but are available at lower costs than DCFC, making them a popular choice for fleet operators whose vehicles have long dwell times such as parking overnight in a depot. Alternatively, DCFC are optimal for fleets that require quicker refueling times, such as emergency service vehicles or transit buses with tight schedules. Fleet operators must evaluate the specific needs of their fleets, including daily mileage, downtime, and operation schedules to determine the best mix of charging infrastructure.

[421] DTE Energy. "DTE EV Hosting Capacity Map." Available at https://dte.maps.arcgis.com/apps/webappviewer/index.html?id=15bba98a360740929f0d5c6bec8fdd6c.

CASE STUDY

The state of Michigan has partnered with Daimler Truck North America and DTE Energy to build a mobility charging hub, referred to as the 'truck stop of the future.' The charging hub will enable companies to transition their fleets to EVs and future-proof their businesses by testing new technologies and business models designed to accelerate the deployment of commercial vehicles at scale and modernize the truck stop experience. Situated in Redford, MI near I-96, an area frequented by more than 10,000 medium- and heavy-duty commercial trucks daily, the charging hub is strategically located to meet the growing demand for electrification infrastructure and support the seamless integration of EVs into Michigan's transportation network.[422]

Pilot programs and dedicated utility incentives for fleet charging applications (as outlined in Table 8) can help to address the unique challenges presented by fleet charging, specifically for medium- and heavy-duty fleet vehicles.

***Table 8:** Utility incentives for fleet/commercial vehicle charging equipment*

Utility Name	Program	Details
Cherryland Electric	Commercial EV Charging Station Rebate	Cherryland Electric Cooperative offers customers a $1,000 rebate on the purchase of qualified commercial Level 2 charging stations for fleet vehicles.[423]
Consumers Energy	Fleet Electrification Assessment & PowerMIFleet	Consumers Energy offers advisory services to fleets operating light-, medium-, and heavy-duty vehicles for electrification opportunities. The PowerMIFleet program offers customers maximum rebates of $5,000 for Level 2 chargers and $35,000 for DCFC for fleet applications. A $70,000 maximum rebate is available for a fleet operator looking to install a DCFC that will also be publicly accessible.[424]
DTE Energy	Business EV Charger Rebate	DTE Energy offers businesses and commercial customers a $2,000 rebate for the purchase of a Level 2 EV charging station and a $55,000 for the installation of a DCFC.[425]
Indiana Michigan Power	Commercial EV Charging Station Rebate	Indiana Michigan Power offers commercial and fleet customers a $2,500 rebate for the installation of a Level 2 EV charging station. Customers may also receive a $500 rebate for each additional Level 2 EV charging station port installed.[426]

Even in instances where a fleet vehicle might be able to access public charging stations, the design of public chargers for passenger vehicles can sometimes hinder medium- and heavy-duty vehicles from using them. As shown in *Figure 21*, design considerations like pull-through or larger parking spaces at public EV charging can increase the number of vehicle types that will be able to utilize an EV charging station.

[422] Achtenberg, K. Michigan Economic Development Corporation. "State of Michigan Partners with Daimler Truck North America and DTE Energy to Build Michigan's 'Truck Stop of the Future.'" June 2023. Available at https://www.michiganbusiness.org/press-releases/2023/06/daimler-dte/.

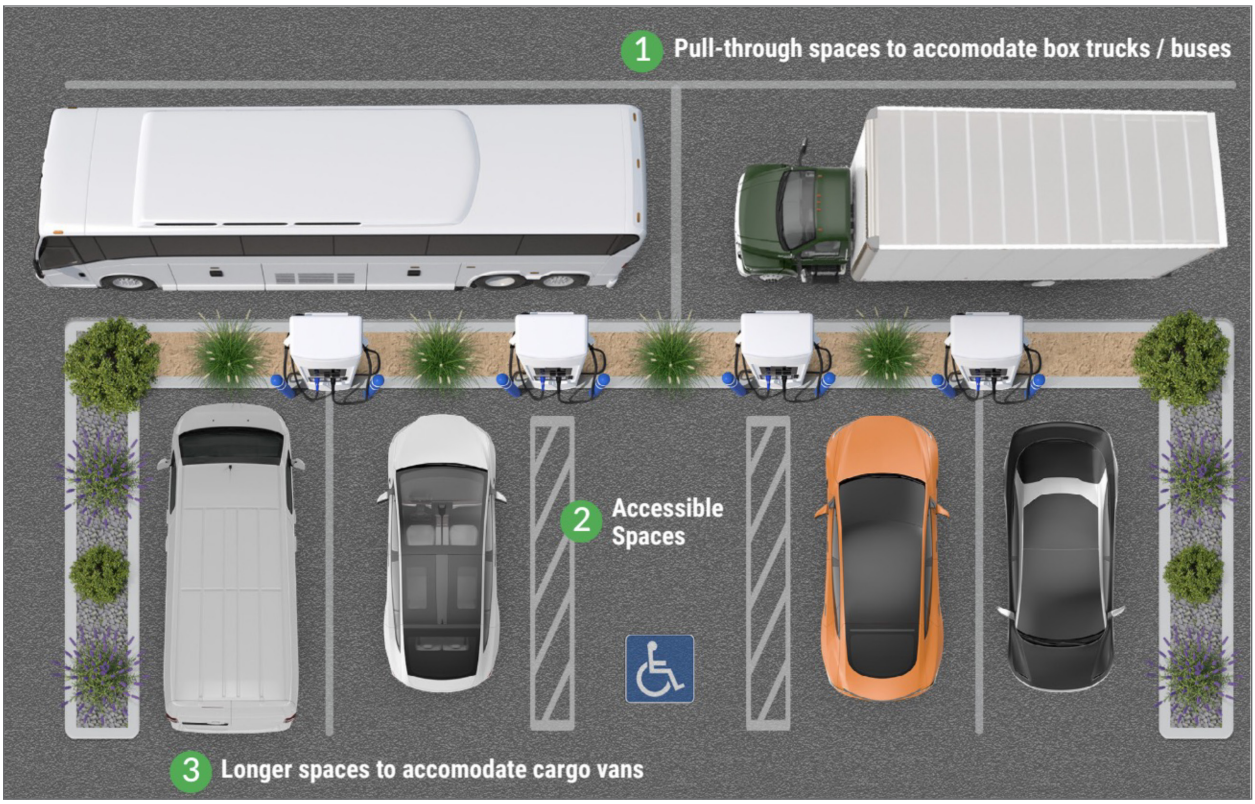
[423] Cherryland Electric Cooperative. "Electric Vehicles." Accessed July 2024. Available at https://cherrylandelectric.coop/ev/.

[424] Consumers Energy. "PowerMI Fleet." Accessed July 2024. Available at https://www.consumersenergy.com/business/savings-and-energy-solutions/products-and-services/electric-vehicle-support-for-business/powermifleet#eligibility-requirements-section.

[425] DTE Energy. "Business EV Charger Rebate." Accessed July 2024. Available at https://www.dteenergy.com/us/en/business/service-request/pev/pev-biz-charge-frwd.html.

[426] Indiana Michigan Power. "Charge at Work in Michigan." Accessed July 2024. Available at https://www.indianamichiganpower.com/clean-energy/electric-cars/business/charge-at-work-michigan.

Figure 21: *Model EV charging station design to provide maximum access to EV charging across various vehicle types*[427]



Section 4.6: Rural Communities

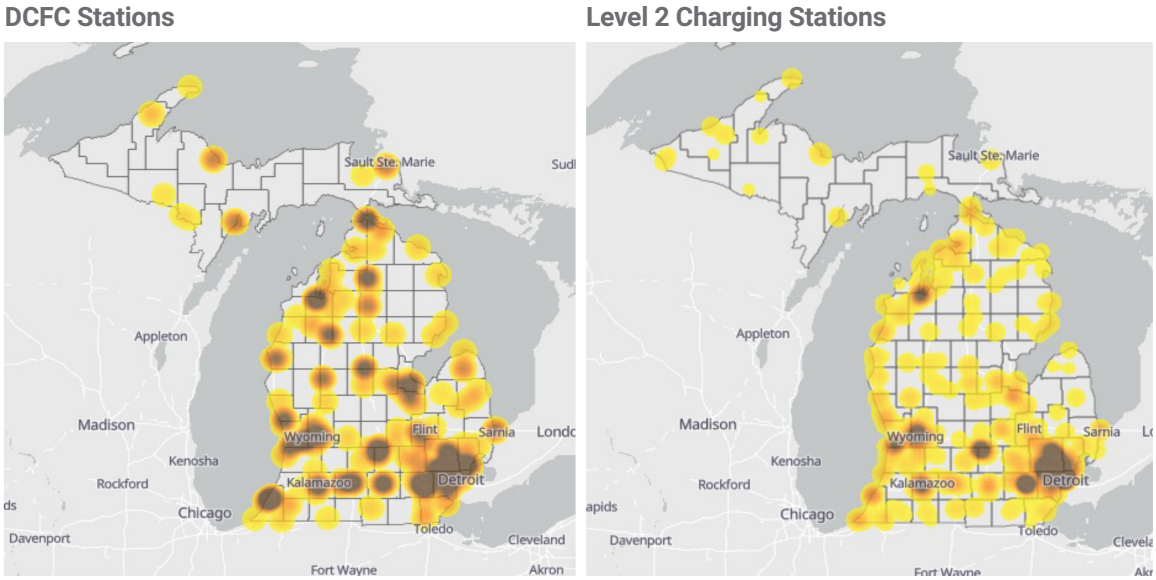
Over 22% of Michigan's population resides in rural areas as designated by the U.S. Department of Agriculture (USDA), but many of these rural areas lack access to public EVSE.[428] According to data provided by the Alternative Fuels Data Center, while Michigan has approximately 1,600 publicly available charging locations with multiple DCFC or Level 2 charging ports, just 604 of these public charging locations are in rural areas.[429] Rural areas have unique challenges related to transportation electrification, including disparities in income, resources, and electric infrastructure. By implementing targeted funding and leveraging educational opportunities to accelerate the growth of EV charging in rural communities, Michigan can bridge the gap between urban and rural areas, ensuring equitable access to clean transportation options for all residents.

[427] Clean Fuels Michigan. "Public EV Charging Stations Can Support Multiple Vehicle Types." Available at https://cleanfuelsmichigan.org/our-resources/public-ev-charging-stations-can-support-multiple-vehicle-types/.

[428] United States Department of Agriculture. "Economic Research Service." Accessed June 2024. Available at https://data.ers.usda.gov/reports.aspx?StateFIPS=26&StateName=Michigan&ID=17854.

[429] State of Michigan. "State of Michigan Community EV Toolkit." Accessed June 2024. Available at https://southeast-michigan-ev-resource-kit-and-planning-hub-semcog.hub.arcgis.com/pages/interactive-maps-and-data-resources.

Figure 22: *Michigan public charging location heat maps*[430, 431]



In addition to ensuring that residents of rural communities have access to EV charging, targeted deployment of EV chargers in Michigan's rural areas will also positively impact the state's tourism industry. Michigan's tourism industry is a significant contributor to the state's economy, generating $48.5 billion in total economic impact in 2022 alone.[432] With its expansive freshwater coastline, numerous lakes, state parks, and diverse winter recreation offerings, Michigan attracts visitors from across the nation year-round. Many of these visitors venture into Michigan's rural communities to experience the state's natural beauty and outdoor activities. As EV adoption continues to rise both in Michigan and nationwide, the importance of EV charging access becomes increasingly evident for sustaining the state's tourism industry. Travelers driving EVs prioritize destinations with reliable access to charging infrastructure. For example, in 2017, West Virginia installed Level 2 chargers at 10 lodges in various state parks. Charging is provided without cost to the user. West Virginia's state park management services have noted an increase in foot traffic at state parks and nearby retail and dining venues as a result of the charger installations.[433] Michigan has made a similar investment, and currently has at least 14 chargers installed at 6 state parks, a fish hatchery, and a state beach, thanks to a collaboration between the DNR, Rivian, and Adopt a Charger, with more on the way.[434]

Without adequate charging options in rural areas, Michigan risks losing out on tourism revenue as visitors may opt for destinations with better EV infrastructure. Therefore, targeted deployment of EV chargers in rural communities not only benefits local residents but also enhances Michigan's appeal as a tourist destination, supporting the continued growth and sustainability of the state's tourism sector.

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[430] *Ibid.*

[431] United States Department of Agriculture. "Economic Research Service." Accessed June 2024. Available at https://data.ers.usda.gov/reports.aspx?StateFIPS=26&StateName=Michigan&ID=17854.

[432] Tourism Economics. Michigan Economic Development Corporation. "Economic Impact of Tourism in Michigan - 2022." Tourism Economics. September 2023. Available at https://medc.app.box.com/s/1ky54etk4wmcr35my13a05d9m30blo83.

[433] U.S. Department of Energy. Alternative Fuels Data Center. "EVs Charge Up West Virginia State Parks." Accessed June 2024. Available at https://afdc.energy.gov/case/3009.

[434] Michigan Department of Natural Resources. "EV Charging Stations." Accessed August 2024. Available at https://www.michigan.gov/dnr/places/state-parks/ev-charging-stations.

In the FY 2024 state budget, the Michigan legislature appropriated $5 million for the Lake Michigan EV Circuit.[435] This was in addition to the $1.2 million already dedicated to the project. As described in *Section 4.3*, the Lake Michigan EV Circuit is a collaborative effort between the states that surround Lake Michigan to create a tourist destination for EV drivers across the country. These targeted investments are intended to boost tourism in the communities on the coast of Lake Michigan, the majority of which are rural. Michigan should continue to pursue targeted investments to expand EV infrastructure on the route and at Michigan's tourist destinations including state and national parks.

CASE STUDY

With the support of a $700,000 grant from the Michigan Economic Development Corporation (MEDC), Polaris began transitioning the outdoor recreation industry in Michigan's Upper Peninsula toward electric with the installation of four Level 2 chargers in Ontonagon County. In the Spring of 2024, Polaris unveiled the nation's first network of EV chargers dedicated for electric off-road vehicles. Four charging stations were installed to service 125 miles of trails in Ontonagon County, passing through the Ottawa National Forest, commercial forest croplands, and seasonal country roads.[436] The installed charging stations are complemented with solar panels to address the lower grid capacity in these rural Michigan communities. By addressing barriers such as limited charging infrastructure and grid constraints, this project by Polaris not only promotes the use of EVs in Michigan's remote regions, but also encourages eco-friendly tourism, supports local economies, and can facilitate rural EV adoption.

RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

For rural communities, EV charging infrastructure can serve as a powerful economic development tool beyond just ensuring access to clean transportation. Strategic co-location of EV chargers near rural downtown areas presents a unique opportunity to drive visitors into local businesses, thereby stimulating economic activity and revitalizing community hubs. When EV drivers stop to charge their vehicles, they often have downtime while waiting for their vehicles to recharge.[437] Often called "destination charging," placing charging stations near rural downtowns, in popular tourism destinations, and at overnight accommodations can provide EV drivers with convenient charging while also encouraging EV drivers to visit local businesses.

By leveraging EV charging infrastructure as an economic catalyst, rural communities can enhance their appeal to visitors, attract new investment, and foster sustainable growth. Additionally, these initiatives can contribute to the overall resilience of rural economies, ensuring their long-term viability and prosperity in an evolving transportation landscape.

The vast majority of Michigan is serviced by the state's two largest investor-owned utilities (IOUs), DTE Energy and Consumers Energy. However, most of Michigan's rural areas, including the Upper Peninsula, are serviced by smaller utilities such as municipal utilities and electric cooperatives. Municipality-owned utilities and member-regulated cooperatives fall outside of the jurisdiction of many of the regulations of the MPSC, which has been encouraging IOUs in the state to be

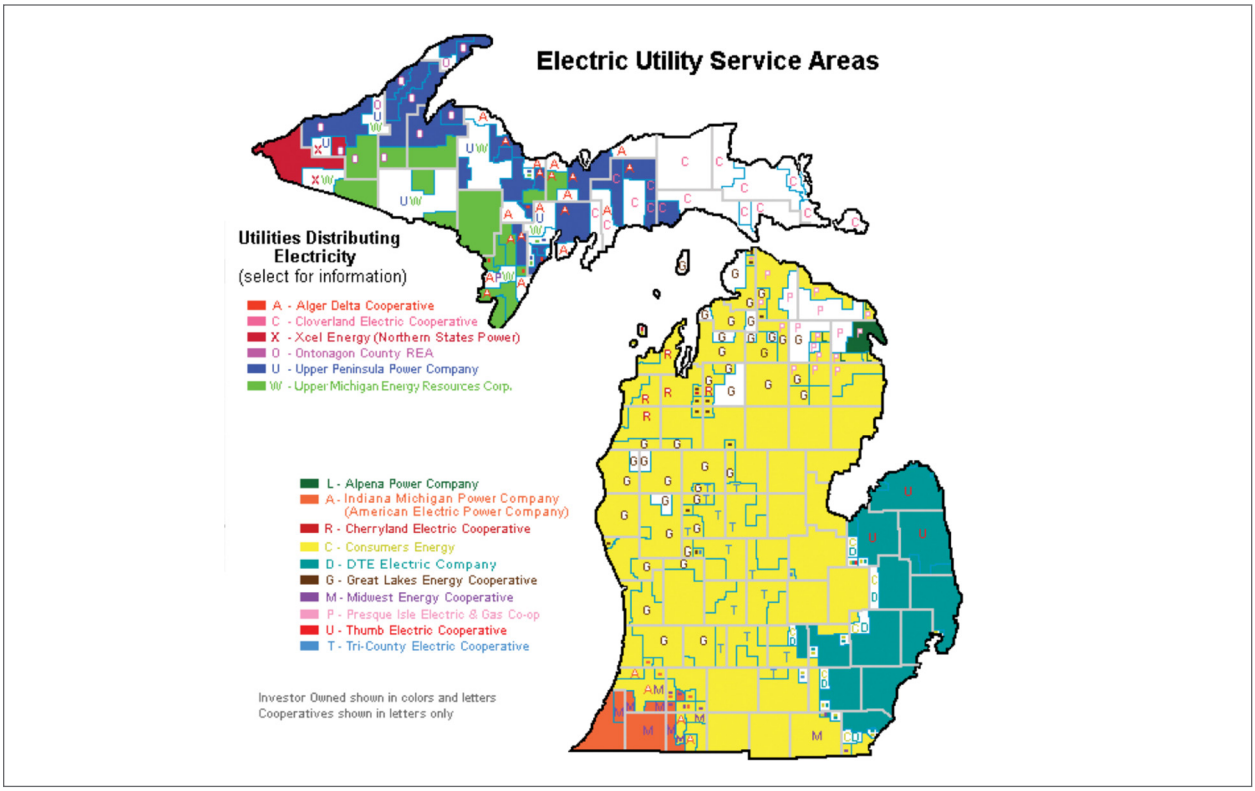
[435] Executive Office of the Governor of Michigan. "What's in the Budget to Upgrade Michigan's Infrastructure?" July 2023. Available at https://www.michigan.gov/whitmer/news/press-releases/2023/07/24/whats-in-the-budget-to-upgrade-michigans-infrastructure#:~:text=%245%20million%20for%20Lake%20Michigan,in%20mobility%20and%20electrification%20sector.

[436] UPword. "It's Electrifying: The UP is Home to First of its Kind Electric Off-Road Vehicle Charging Network." Available at https://www.secondwavemedia.com/upword/features/electrictrails.aspx.

[437] U.S. Department of Transportation. "Electric Vehicle Charging Speeds." Accessed June 2024. Available at https://www.transportation.gov/urban-e-mobility-toolkit/e-mobility-basics/charging-speeds.

proactive in planning for transportation electrification (see *Section 6.5*). Grid capacity and reliability challenges plague rural communities throughout the U.S., including Michigan, where lost electric service was reported to have a negative $1.6 billion economic impact from 2020 – 2021.[438] These challenges require the deployment of more innovative technologies, such as battery-enabled charging solutions, that not only minimize grid impact while still enabling local transportation but can also serve to support grid stability by acting as back-up power during electricity outages.

Figure 23: *Electric utility service area map*[439]



RECOMMENDATION

Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, multi-family housing, and fleet charging applications.

Supporting rural municipal utilities and electric co-ops is crucial to ensuring that Michigan's most remote communities are not left behind in the transition to EVs. Providing education opportunities and resources to these electric utility providers is essential so that they can meet the needs of their customers. These utilities should be encouraged to support transportation electrification in their service areas through the establishment or expansion of residential and commercial charging programs in accordance with state goals. By equipping smaller utilities with the knowledge and tools to support EV infrastructure, Michigan can promote equitable access to EV charging.

[438] Rabago, K. and R. Dutta. Local Solar for All. "The Economic Impact of Michigan's Unreliable Power Grid." 2023. Available at https://www.house.mi.gov/Document/?Path=2023_2024_session/committee/house/standing/energy,_communications,_and_technology/meetings/2023-06-07-1/documents/testimony/060723LocalSolarforAll.pdf.

[439] Michigan Public Service Commission. "Electricity Utility Service Area Map." Accessed July 2024. Available at https://www.michigan.gov/mpsc/consumer/electricity/electric-utility-service-area-map.

SECTION 5: CURRENT STATE OF TRANSPORTATION ELECTRIFICATION: EV ADOPTION AND DEPLOYMENT

Michigan, accounting for 20% of total automotive production in the U.S., has long been recognized as the epicenter for automotive innovation.[440] This legacy has continued as the state has been successful in growing its capacity to manufacture EVs in recent years, positioning itself at the forefront of the transition to electric mobility. However, despite its manufacturing prowess, Michigan finds itself at a critical juncture as the state begins to fall behind in early adoption levels of EVs. While the state continues to bolster its capacity to produce EVs, it lags behind in deploying them, trailing other states in the Midwest and across the country in EV adoption rates across all vehicle types. This disconnect highlights the pressing need for concerted efforts to bridge the gap between manufacturing EVs and on-road deployment as Michigan charts its course toward deploying 2 million EVs by 2030.

As detailed below, there are specific challenges to both the adoption of light-duty and medium- and heavy-duty (MHD) EVs. In addition to the financial barriers outlined below, there are also challenges with a lack of customer and fleet operator information and education. Historically, car buyers relied heavily on the expertise at automotive dealerships for information about prospective vehicles. Today, however, nearly 40% of dealers offer consumers the ability to complete all steps of the purchasing process online.[441] Despite this shift, given the nascence of EV development and consumers' familiarity with EVs, 93% of customers feel that test drives and dealership engagement remain important steps in considering the purchase of an EV.[442] In fact, a recent study shows that approximately 75% of EV owners expect dealers to be knowledgeable on topics of importance to new EV owners, but also found that the traditional, high-pressure ICE auto sales model leads to customer hesitation and frustration.[443] Potential EV buyers are not only looking to dealerships for information about the vehicle, but about the charging requirements and different incentives available to them as well. Just as municipalities need to be educated on how to prepare for increased EV adoption in their communities, so too do local auto dealerships on the different technologies and incentive programs. To effectively inform the EV-curious customer and serve the growing EV market, it is, therefore, incredibly important that vehicle salespeople have regular communication with automotive OEMs, utilities, and municipalities.

Section 5.1: Passenger Vehicles

In 2022, there were 9.4 million vehicles registered in the state of Michigan.[444] Of these, just 33,100 were EVs, meaning the total share of EVs registered in Michigan makes up less than 0.5% of all vehicles registered in the state.[445] With just over 33,000 EVs registered in the state, that positions Michigan as the 18th state in terms of total number of EV registrations, and 29th in terms of per-capita adoption.[446] These numbers show Michigan as being in the middle of the pack in terms of EV adoption nationally, highlighting the fact that there is significant room for growth in Michigan's EV market.

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[440] Kuykendall, K. "EV manufacturing race: Which US states are taking an early lead?" *S&P Global.* May 2023. Available at https://www.spglobal.com/marketintelligence/en/mi/research-analysis/ev-manufacturing-race-which-us-states-are-taking-early-lead.html.

[441] Hickey, J. "Digital Retailing Continues to Grow at Auto Dealerships." *Digital Dealer.* November 2023. Available at https://digitaldealer.com/data-analytics/digital-retailing-continues-to-grow-at-auto-dealerships/.

[442] Electrification Coalition. "EVs and Consumer Choice." Accessed June 2024. Available at https://electrificationcoalition.org/work/state-ev-policy/evs-and-consumer-choice/#:~:text=93%20percent%20of%20customers%20polled,the%20full%20car%20purchasing%20experience.

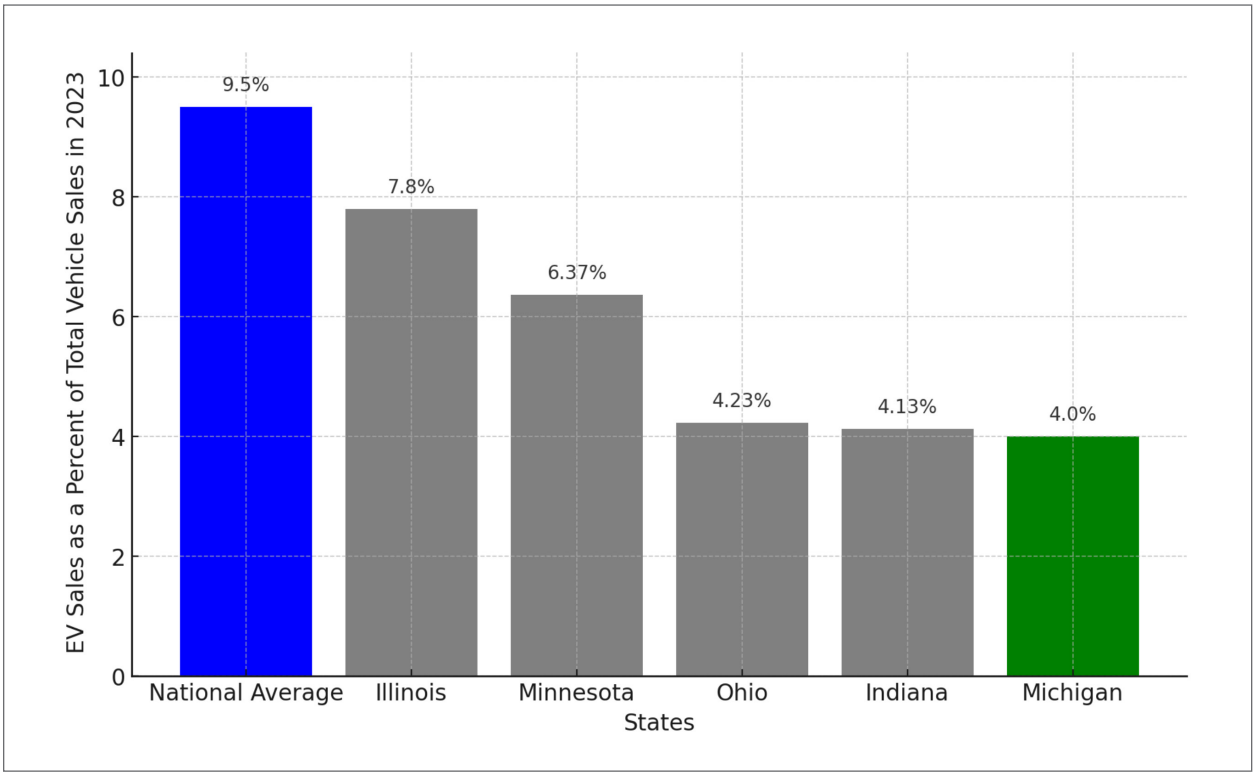
[443] Perficient. "Consumers Expect More from Automakers and Dealers." Accessed June 2024. Available at https://www2.perficient.com/electric-vehicle-customer-journey-research.

[444] U.S. Department of Transportation. Bureau of Transportation Statistics. "State Highway Travel." Accessed June 2024. Available at https://www.bts.gov/browse-statistical-products-and-data/state-transportation-statistics/state-highway-travel.

[445] U.S. Department of Energy. Alternative Fuels Data Center. "Vehicle Registration Counts by State." Accessed June 2024. Available at https://afdc.energy.gov/vehicle-registration.

[446] U.S. Department of Energy. Alternative Fuels Data Center. "TransAtlas." Accessed June 2024. Available at https://afdc.energy.gov/transatlas#/?year=2022&view=per_capita&state=MI.

Figure 24: *Percentage of EV sales in Midwest states compared to the national average*[447]



Michigan also lags behind in terms of market share of EVs sold compared to all new vehicles sold. In 2023, 552,211 vehicles were sold in Michigan,[448] and just 4% of those sales were for BEVs.[449] That positions Michigan at 37th in terms of EV market share in 2023, behind neighbors in the Midwest such as Indiana (36th, 4.13%), Ohio (35th, 4.23%), Minnesota (23rd, 6.37%) and Illinois (18th, 7.80%) and well below the national average where EV sales represented 9.5% of the market.[450] While the market penetration of EVs in Michigan is below average, it is important to note that the 4% market share in 2023 is up from 3.4% in 2022 and 2.13% in 2021.[451] The growth in market penetration suggests growing consumer interest in EVs in Michigan, albeit at a slower pace compared to other states.

The current state of light-duty EV adoption in Michigan highlights an opportunity for sustained efforts to bolster consumer awareness and incentivize adoption to position Michigan as a leader in the EV transition. Range anxiety, limited charging infrastructure, and the cost of EVs relative to traditional ICE vehicles represent some of the barriers to widespread EV adoption in Michigan. These hurdles underscore the need for targeted intervention to accelerate Michigan's transition to electric mobility.

Overcoming Barriers to Adoption

Generally, the primary consideration a consumer makes when purchasing a new vehicle is the price. The higher relative cost of EVs (compared to ICE vehicles) has been a noted hurdle for adoption. In 2023, the average cost of an EV was $51,600,

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[447] Alliance for Automotive Innovation. "Get Connected: Electric Vehicle Quarterly Report." 2023. Available at https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023%20Q4.pdf.

[448] F&I Tools. "Car Sales by State." Accessed June 2024. Available at https://www.factorywarrantylist.com/car-sales-by-state.html.

[449] Alliance for Automotive Innovation. "Get Connected: Electric Vehicle Quarterly Report." 2023. Available at https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023%20Q4.pdf.

[450] *Ibid.*

[451] Alliance for Automotive Innovation. "Get Connected: Electric Vehicle Quarterly Report." 2022. Available at https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%202022%20Q4%20Electric%20Vehicle%20Report.pdf.

which represents a $12,000 decline in average price from 2022.[452] However, EVs remain more expensive compared to the average cost of all new light-duty vehicles sold in 2023 at $48,300.[453] The disparity becomes even greater when you consider the cost of a new subcompact car which averages around $25,000.[454] To combat the price disparity, tax incentives and rebates have emerged as powerful tools to increase consumer adoption of EVs as markets develop, competition increases, and prices for EVs continue their downward trend. Despite higher upfront costs, BEVs have been proven on average to have a lower total cost of ownership compared to gasoline alternatives due to lower maintenance and operations costs.[455] By leveraging financial incentives, policymakers can mitigate the upfront cost burden associated with purchasing an EV, while passing on cost savings from EV ownership to the consumer.

Since 2010, the IRS has offered a $7,500 tax credit for low-emission vehicles such as BEVs and PHEVs. In 2023, the IRA extended a series of existing tax credits including the $7,500 credit for certain BEVs and PHEVs through 2032 with the addition of requirements that the vehicles be assembled in America and under certain price caps depending on the vehicle type.[456] A tax credit for used clean vehicles exists as well.[457] In January 2024, the IRS opened the Energy Credits Online (ECO) portal for car dealerships to register as an authorized seller, allowing them to offer buyers the tax credit as a discount at the point-of-sale.[458] As of January 2024, over 8,700 dealers, almost half of America's dealers, had already registered in the ECO portal.[459]

Effective incentives improve the issues of affordability of EVs for price-sensitive consumers. In Michigan, these federal tax credits are the only incentives that exist for the purchase of a new or used EV. In comparison, 17 other states and Washington, DC have various incentives that residents can use in addition to the federal tax credits (Table 9) and lead the country in EV adoption.[460, 461]

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[452] Alliance for Automotive Innovation. "Get Connected: Electric Vehicle Quarterly Report." 2023. Available at https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20EV%20Quarterly%20Report%202023%20Q4.pdf.

[453] *Ibid.*

[454] Kelly Blue Book. "New-Vehicle Average Transaction Prices Retreat for Second Straight Month." March 2024. Available at https://mediaroom.kbb.com/2024-03-11-New-Vehicle-Average-Transaction-Prices-Retreat-for-Second-Straight-Month,-According-to-Latest-Kelley-Blue-Book-Estimates#:~:text=Mar%2011%2C%202024-,New%2DVehicle%20Average%20Transaction%20Prices%20Retreat%20for%20Second%20Straight%20Month,Latest%20Kelley%20Blue%20Book%20Estimates&text=New%2Dvehicle%20average%20transaction%20prices%20(ATP)%20in%20February%202024,from%20the%20December%202022%20peak.

[455] Ochoa, J. University of Michigan. "Electric vs. gasoline vehicles: Is ownership competitive in your area?" *Michigan News*. January 2024. Available at https://news.umich.edu/electric-vs-gasoline-vehicles-is-ev-ownership-competitive-in-your-area/.

[456] Internal Revenue Service. "Credits for New Clean Vehicles Purchased in 2023 or After." Accessed June 2024. Available at https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after.

[457] Internal Revenue Service. "Used Clean Vehicle Credit." Accessed June 2024. Available at https://www.irs.gov/credits-deductions/used-clean-vehicle-credit.

[458] Torchinsky, R. "IRS Opens Portal for Car Dealers to Dole Out EV Tax Credits at Point-of-Sale." *Forbes.* November 2023. Available at https://www.forbes.com/sites/rinatorchinsky/2023/11/01/irs-opens-portal-for-car-dealers-to-dole-out-ev-tax-credits-at-point-of-sale/.

[459] Budryk, Z. "Treasury: Nearly 9,000 Auto Dealers Have Registered for Electric Vehicle Tax Credit." *The Hill.* January 2024. Available at https://thehill.com/policy/energy-environment/4391508-electric-vehicle-tax-credit-point-of-sale-9000-auto-dealers-registered-treasury/.

[460] Wakefield, C. Kelley Blue Book. "Electric Car Rebates and Incentives What to Know by State." February 2024. Available at https://www.kbb.com/car-advice/electric-vehicle-rebates-by-state/.

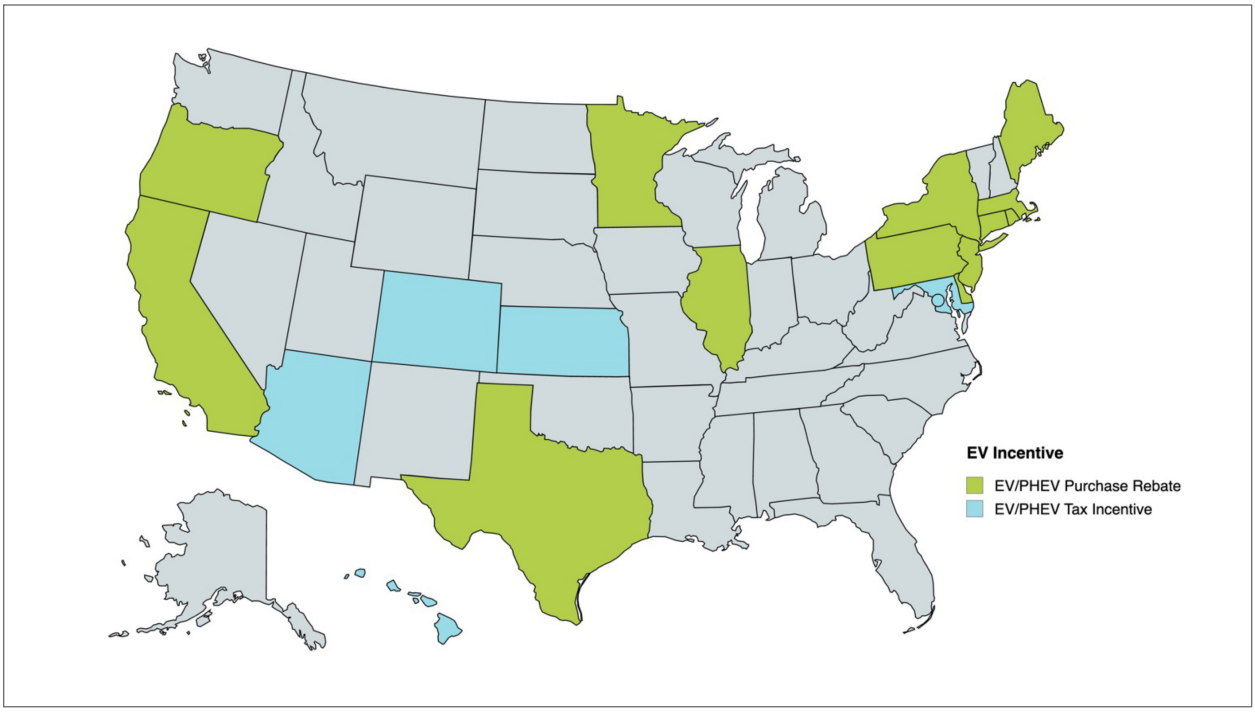
[461] U.S. Department of Energy. Alternative Fuels Data Center. "Search Federal and State Laws and Incentives." Accessed June 2024. Available at https://afdc.energy.gov/laws/search#/.

Table 9: *State incentives for the purchase of passenger EVs or PHEVs*[462]

State	Incentive Offered
California	The Clean Vehicle Rebate Project offers rebates of amounts up to $2,000 for BEVs and $1,000 for PHEVs. Rebate amounts and eligibility are based on gross annual income.
Connecticut	The Connecticut Hydrogen and Electric Automobile Purchase Rebate Program offers point-of-sale rebates of up to $9,500 for the purchase or lease of a hydrogen fuel cell EV, BEV, or PHEV for vehicles with manufacturer's suggested retail prices (MSRPs) of less than $50,000.
Delaware	The Delaware Clean Transportation Incentive Program offers rebates for the purchase or lease of a new EV or PHEV of up to $2,500. Rebates are only available for vehicles with an MSRP of less than $50,000.
Illinois	The Illinois Environmental Protection Agency offers rebates for the purchase of new or pre-owned EVs of up to $4,000. Funding is prioritized for LI applicants.
Maine	Maine's EV Accelerator provides rebates for the purchase or lease of a new EV or PHEV at participating Maine dealerships or directly from OEMs of up to $7,500 with the highest rebate amount available for qualified LI buyers.
Massachusetts	The Massachusetts Department of Energy Resources offers rebates of up to $3,500 for the purchase or lease of eligible ZEVs. An additional $1,500 is available for qualified LI buyers.
Minnesota	The Minnesota Department of Commerce offers rebates for the purchase or lease of new or pre-owned EVs or PHEVs of up to $2,500. The vehicle's MSRP must be less than $55,000 for a new vehicle and $25,000 for a pre-owned vehicle.
New Jersey	Charge Up New Jersey offers rebates of up to $4,000 for the purchase of eligible BEVs.
New York	The New York State Energy Research and Development Authority provides rebates of up to $2,000 for the purchase or lease of a new eligible EV.
Oregon	The Charge Ahead Rebate Program offers low- and medium-income buyers a rebate of up to $5,000 for new or pre-owned EVs.
Pennsylvania	The Pennsylvania Department of Environmental Protection offers rebates for the purchase or lease of qualifying new or pre-owned EVs. A $2,000 rebate is available for EVs, and a $1,000 rebate is available for PHEVs. An additional rebate of $1,000 is available for LI buyers.
Rhode Island	Buyers in Rhode Island are eligible for a rebate of up to $1,500 for the purchase of qualified new or pre-owned ZEVs and PHEVs.
Texas	The Texas Commission on Environmental Quality offers a rebate of up to $2,500 for the purchase of new or pre-owned EVs or PHEVs.

[462] *Ibid.*

Figure 25: *Landscape of EV purchase incentives in the US*



As shown in Table 9, state EV incentives range in amount and in type, with some states offering state income tax credits, rebates, or sales tax exemptions. These incentives are stackable with the federal tax credit, meaning residents of some states are eligible for more than $10,000 in incentives for the purchase of a new EV. All 17 states that have these incentives and the District of Columbia surpass Michigan in EV adoption by every metric previously discussed in this section.

RECOMMENDATION

Adopt incentives in the state budget to enable the adoption of new and used (owned and leased) passenger EVs, targeting incentives toward moderate and low-income buyers.

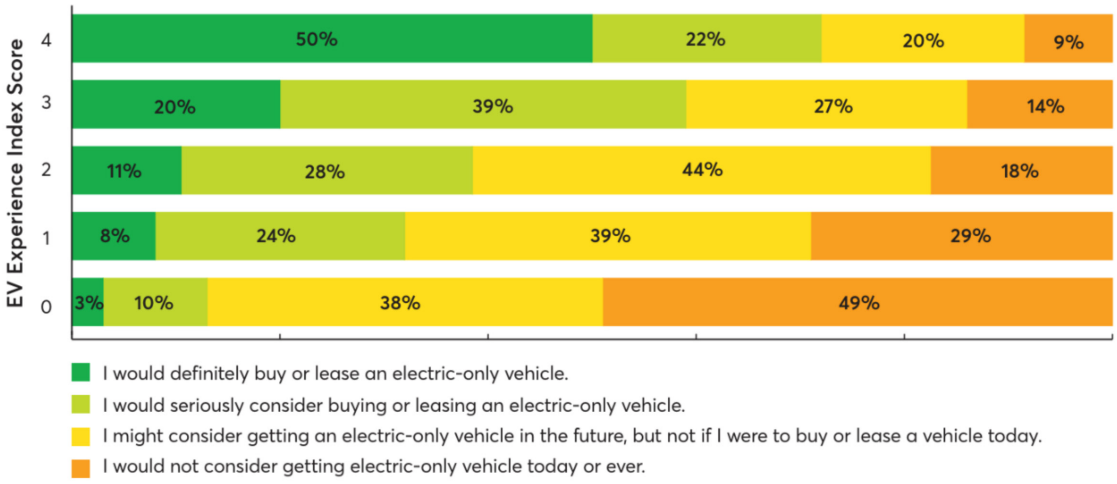
By introducing strategic incentives for Michigan residents, state policymakers can mitigate the upfront cost burden currently associated with purchasing an EV while passing on the cost savings benefits of EV ownership to consumers. Targeted incentives are specifically important for low- and moderate-income buyers to ensure equitable access to clean mobility options. In recent years, Governor Whitmer has proposed rebates for the purchase of electric vehicles in the executive budget recommendation, but the legislature has not included funding for EV rebates in the state's budget.[463] Recognizing the importance of comprehensive incentive packages that are stackable with federal tax credits, Michigan should explore opportunities to introduce new financial incentives to bolster EV adoption rates and strengthen the state's position in the electric mobility sector.

[463] Executive Office of the Governor. "Governor Whitmer's Plan to Lower the Cost of Electric Vehicles." January 2022. Available at https://www.michigan.gov/whitmer/news/press-releases/2022/01/26/gov--whitmers-plan-to-lower-the-cost-of-electric-vehicles.

Section 5.2: Fleet Vehicles

Fleet vehicles, comprising both public and private fleets, form the backbone of Michigan's transportation infrastructure, supporting essential services, commerce, and economic activity across the state. The electrification of fleet vehicles emerges as a critical strategy to further reduce emissions, enhance sustainability, and drive innovation in the transportation sector.

Figure 26: *Positive EV experience increases propensity to purchase an EV as next vehicle*[464]



As shown in Figure 26, fleets can also be an important gateway for employees to gain first-hand experience driving an EV and increase the likelihood that the employee purchases an EV themselves in the future. As employees gain familiarity with EVs through their daily work, they become more familiar and comfortable with the functionalities and benefits of these vehicles. Hands-on experience can alleviate common concerns related to range anxiety, charging infrastructure, and vehicle performance. By integrating EVs into fleet operations, businesses not only contribute to their own sustainability goals, but also act as a catalyst for broader EV adoption, as informed and experienced employees are more likely to consider EVs for their personal use.

Fleet vehicles, which include both light-duty and MHD vehicles, require access to reliable, unrestricted charging infrastructure to maintain operational efficiency.[465] Fleet operators cannot rely solely on the buildout of public charging infrastructure. Instead, as described in *Section 4.5*, they require dedicated charging solutions such as depot charging to ensure seamless operations and minimal downtime. Despite this challenge, the opportunity for transitioning fleet vehicles to electric propulsion in Michigan is immense, and a necessary step to achieving the state's transportation decarbonization goals.

State Fleet

In December 2023, Governor Whitmer issued Executive Directive 2023-5 to transition the state's fleet to ZEVs.[466] The state's light-duty vehicles must be converted to zero-emission alternatives by 2033 and MHD vehicles must be converted to ZEVs by 2040. These targets position Michigan at the forefront of state fleet decarbonization efforts, setting some of the country's

[464] Consumer Reports. "2023 Consumer Reports Electric Vehicle Survey." Available at https://advocacy.consumerreports.org/wp-content/uploads/2024/02/CR_2023EV-Survey_Facthseet_Final.pdf.

[465] Porter, E. RMI. "Electric Trucks Can Move Our Stuff Today." May 2022. Available at https://rmi.org/electric-trucks-can-move-our-stuff-today/.

[466] Executive Office of the Governor. Executive Directive 2023-5: Conversion of State Fleet. December 2023. Available at https://www.michigan.gov/whitmer/news/state-orders-and-directives/2023/12/05/executive-directive-2023-5-conversion-of-state-fleet.

most aggressive state fleet decarbonization goals.[467] In 2023, the state operated a total of 14,482 vehicles.[468] Of these, just 14 are EVs.[469] Transitioning to EVs in the state fleet will yield taxpayer benefits, as EVs have a lower total cost of ownership. When Florida was considering implementing a total cost of ownership analysis for the procurement of new state vehicles, a study found that the state could save nearly $280 million in taxpayer dollars by transitioning its fleet to EVs.[470] By directing Michigan's fleet to zero-emission alternatives, Executive Directive 2023-5 not only underscores the state's commitment to sustainability, but also serves as a catalyst for market transformation. Procurement targets like this give assurance to EV manufacturers that there will be customers for their vehicles. As public entities increase demand for EVs with their own ZEV targets, the market will achieve economies of scale, leading to lower production costs that have the co-benefit of making EVs more accessible to everyday consumers.

RECOMMENDATION

Transition all state fleet vehicles to 100% EVs. Plans should be updated regularly to account for vehicle availability, price fluctuations, etc., and should be made publicly available.

Importantly, Executive Directive 2023-5 directs the state to coordinate with higher education institutions and local governments in Michigan to assist with their transitions to zero-emission fleets. Local governments and other public entities often face capacity constraints such as limited budgets and resources that hinder their ability to invest in transitioning their fleets to ZEVs. By providing financial support, technical assistance, and policy guidance, the state can help local governments overcome these barriers, ensuring that the benefits of cleaner transportation extend to all communities. Collaborative effort can lead to the creation of more robust and accessible charging infrastructure, increased public awareness and acceptance of ZEVs, and achievement of statewide goals for clean vehicle deployment.

Private Fleets

Private fleets, operated by businesses and organizations across various sectors, play a crucial role in the movement of goods and services within Michigan and beyond. MDOT estimates that 75% of all freight tonnage was moved by truck through and across the state in 2021, underscoring the significance of trucking in the state's freight transportation network.[471] Michigan's strategic location and extensive network of highways make it a pivotal hub for freight movement, serving as a vital link in the supply chain connecting the Midwest to domestic and international markets. In fact, Michigan is home to two of the three busiest truck-freight ports between the U.S. and Canada, highlighting the state's importance in facilitating cross-border trade and commerce.[472] Fleet operators are increasingly exploring electrification to enhance operational efficiency, reduce emissions, and meet sustainability goals.

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[467] American Council for an Energy-Efficient Economy. "State and Local Policy Database." Accessed June 2024. Available at https://database.aceee.org/state/fleets.

[468] Michigan Department of Technology, Management, and Budget. "2024 State of Michigan Fleet Plan." December 2023. Available at https://www.michigan.gov/dtmb/-/media/Project/Websites/dtmb/Law-and-Policies/Legislative-Reports/FY2024/2024-Fleet-Plan.pdf?rev=5934b56180ef4528b96c3f6bce6efe2d&hash=F26254AA99BACBB8A98E2C2053912378#:~:text=again%20in%20FY2024.-,FUEL%20CONSUMPTION,of%20fuel%2C%20traveling%20109%2C280%2C234%20miles.

[469] Gardner, P. "Gretchen Whitmer is all-in on EVs. But State's Fleet is Almost All Gas Powered." *Bridge Michigan.* July 2024. Available at https://www.bridgemi.com/business-watch/gretchen-whitmer-all-evs-states-fleet-almost-all-gas-powered.

[470] The Electrification Coalition and Advanced Energy United. "Saving Taxpayer Money on Florida's Vehicle Fleet: Total Cost of Ownership Survey and Savings." March 2023. Available at https://electrificationcoalition.org/wp-content/uploads/2023/03/Florida-TCO-Analysis-Vehicle-Fleet.pdf.

[471] Michigan Department of Transportation. "Fast Facts 2024." Accessed June 2024. Available at https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Programs/Planning/MDOT-Fast-Facts.pdf.

[472] U.S. Department of Transportation. Bureau of Transportation Statistics. "TransBorder Freight Annual Report 2023." May 2024. Available at https://www.bts.gov/newsroom/transborder-freight-annual-report-2023.

CASE STUDY

With more than 750 trucks in its fleet, Meijer operates Michigan's largest standalone fleet, playing a pivotal role in the state's logistics landscape.[473] In 2022, Meijer made headlines as the first retailer to operate all-electric semis in a cold-weather environment, showcasing its commitment to cutting-edge technology and environmental stewardship.[474] The deployment of two all-electric semis marked a groundbreaking achievement, demonstrating the feasibility and viability of EVs in demanding operational conditions. Meijer's electric semis continue to make daily deliveries to Meijer supercenters within a 200-mile trip range of the Lansing distribution center, showcasing the practicality and efficiency of electric transportation solutions for last-mile delivery operations. The distribution center has been fitted with the necessary charging infrastructure to ensure seamless operations. The success of these EV semi-trucks serves as proof of concept and will likely encourage other fleet operators in the state to take similar steps to decarbonize their vehicles.

RECOMMENDATION

Establish low-cost financing opportunities for organizations, such as local units of government, political subdivisions, universities, and businesses looking to electrify fleets, paired with education to foster participation in DACs and rural areas.

In addition to businesses moving freight across the state, businesses of all sizes frequently operate fleets of light-duty vehicles in their day-to-day operations. While large businesses have fleet experts on staff, many small businesses need guidance in the procurement process to understand which EVs can meet the needs of their fleets, in addition to needing technical assistance to navigate various incentives to lower the cost of purchasing EVs and the necessary charging infrastructure. For public fleets, efforts like the Climate Mayors EV Purchasing Collaborative exist to leverage collective buying power to accelerate the conversion of fleets to EVs.[475] By coordinating purchases of EVs and charging infrastructure, the program demonstrates significant demand for EVs and provides access to educational resources, training, and technical support for capacity-constrained and under-resourced municipal staff. A similar program should be implemented to support small-business owners. Coordinating a bulk-buying program and offering resources to private fleet operators will leverage collective purchasing power, helping private fleet operators to feel more confident about transitioning to EVs.

Medium- and Heavy-Duty Vehicles

Despite making up a smaller proportion of vehicles on the road, MHD vehicles are responsible for nearly a quarter of all greenhouse gas emissions in the transportation sector.[476] Additionally, LI communities are disproportionately impacted by transportation emissions due to their proximity to heavy traffic.[477] Consequently, a focus on transitioning MHD vehicles to

[473] Meijer. "Truck fleet." Accessed June 2024. Available at https://meijercommunity.com/truck-fleet.

[474] Meijer. "Meijer First Retailer to Run All-Electric Semitrucks in Cold Weather Environment." December 2022. Available at https://newsroom.meijer.com/2022-12-15-Meijer-First-Retailer-to-Run-All-Electric-Semitrucks-in-Cold-Weather-Environment.

[475] The Electrification Coalition. "EV Fleets." Accessed July 2024. Available at https://electrificationcoalition.org/work/ev-fleets/#:~:text=The%20Climate%20Mayors%20EV%20Purchasing,of%20municipal%20fleets%20to%20electric.

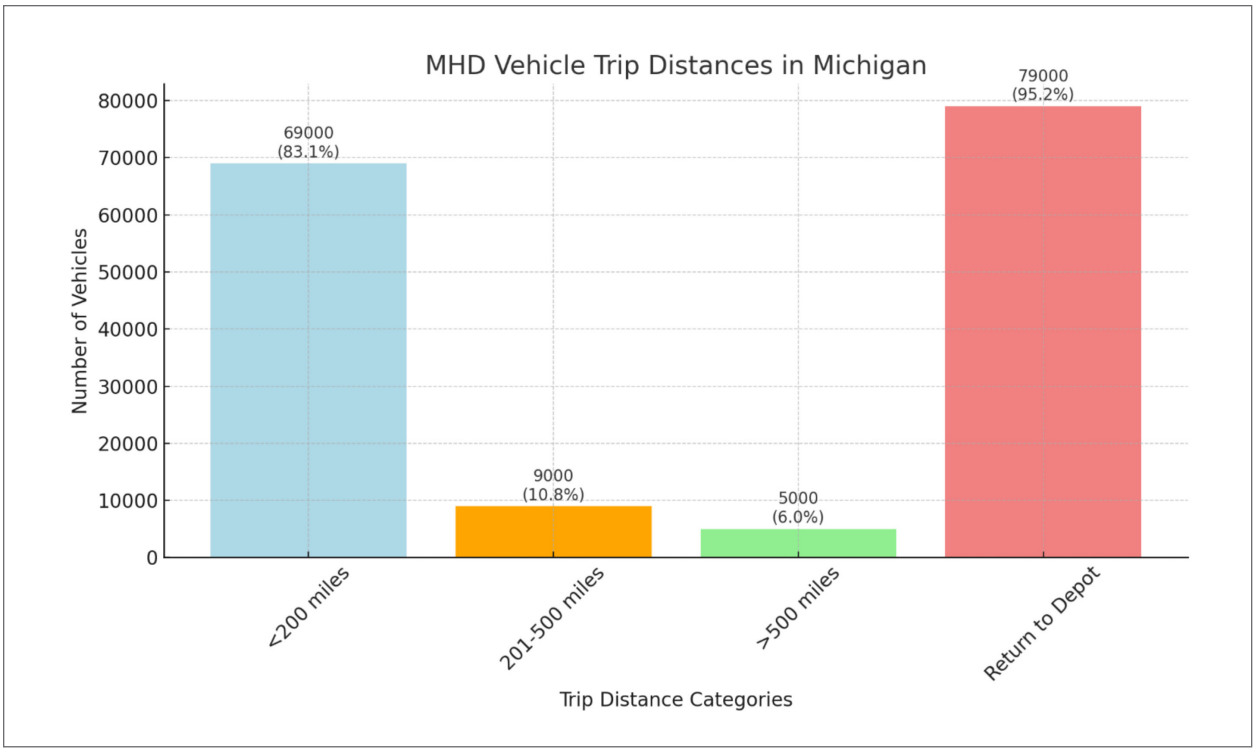
[476] U.S. Environmental Protection Agency. "Fast Facts on Transportation Greenhouse Gas Emissions." Accessed June 2024. Available at https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions.

[477] Center for Climate and Energy Solutions. "How Electrified Transportation can Benefit Low-Income Communities." November 2017. Available at https://www.c2es.org/press-release/brief-how-electrified-transportation-can-benefit-low-income-communities/.

EVs will spur quick progress toward decarbonizing Michigan's transportation sector. MHD vehicles are defined by the EPA as vehicles with a gross vehicle weight rating of more than 8,500 lbs and include class 3-8 vehicles.[478] MHD vehicles represent a wide range of vehicle types with a variety of use cases including semi-trucks, box trucks, school and transit buses, garbage trucks, and freight transportation. The ability to transition a MHD vehicle to an EV alternative is highly dependent on the type of vehicle and the type of route it follows.

According to surveys of freight operators in Michigan, there are approximately 83,000 MHD vehicles registered in Michigan.[479] As shown in Figure 27, the majority of these vehicles are estimated to travel less than 200 miles per trip, with just 9,000 MHD trucks traveling between 201-500 miles and an estimated 5,000 traveling more than 500 miles per trip.[480] Furthermore, 79,000 of these vehicles are estimated to return to a central location or depot after completing a trip.[481]

Figure 27: *Michigan's MHD vehicle travel trends*[482]



The prevalence of shorter travel distances and the tendency for vehicles to return to a central location between uses make electrification a realistic and practical goal for many fleet operators in the state. Electrifying vehicles with predictable routes and centralized charging infrastructure will maximize the efficiency and effectiveness of Michigan's MHD EV deployment strategies.

While MHD EVs currently only represent a small fraction of the vehicles on the road in Michigan, there are many successful examples in Michigan of electrifying MHD vehicles, such as:

[478] U.S. Department of Energy. Alternative Fuels Data Center. "Vehicle Weight Classes and Categories." Accessed June 2024. Available at https://afdc.energy.gov/data/10380.

[479] Atlas EV Hub. Accessed June 2024. Available at https://www.atlasevhub.com/.

[480] *Ibid.*

[481] *Ibid.*

[482] *Ibid.*

- ***School Buses:*** Perhaps the most successful instance of MHD EV adoption, school districts across the state have taken advantage of federal and state incentives to replace diesel buses with electric school buses (ESBs). ESBs typically operate a fixed route and return to a central depot each night. If provided access to reliable charging infrastructure, school buses are prime candidates for electrification. School buses also allow the entire community – students, parents, teachers, drivers, and more – to learn about electric vehicles, furthering EV education in the community. Michigan boasts one of the nation's largest electric school bus fleets, with more than 200 ESBs deployed or purchased.[483] In addition to FY 2024 state budget funding for ESBs, federal funding has supported the purchase of more than 250 ESBs in more than 50 school districts.[484] In alignment with the federal Justice40 initiative, funding was prioritized for school districts in low-income, rural, or tribal areas.[485]

- ***Transit Buses:*** In 2021, the Blue Water Area Transit Commission became the first transit authority in Michigan to deploy electric transit buses, deploying two EV buses.[486] Since then, the Capitol Area Transportation Authority (CATA),[487] Detroit Department of Transportation (DDOT),[488] and the University of Michigan,[489] among others, have committed to or begun deploying electric buses. While still in early stages, studies on transit bus electrification in other municipalities across the country have found that cities can save between $73,000 and $173,000 per unit over the vehicle's lifetime.[490] Despite the current higher upfront cost of electric transit buses, cost savings are derived from significantly lower fueling, operations, and maintenance costs.

- ***Medium-Duty Delivery Trucks:*** Medium-duty trucks are often used to deliver goods to customers. Compared to buses, these vehicles typically do not have a fixed route, but will generally return to a central depot in between uses. Amazon has deployed several electric delivery vans across Michigan, a transition that the company says has increased efficiency, driver safety, and delivery reliability in addition to reducing carbon emissions.[491]

RECOMMENDATION

Support incentives in the state budget to enable the adoption of new and used (owned and leased) light-, medium-, and heavy-duty EVs for public and private fleets, prioritizing those operating primarily in DACs.

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[483] U.S. Environmental Protection Agency. "Clean School Bus Program Awards." Accessed June 2024. Available at https://www.epa.gov/cleanschoolbus/clean-school-bus-program-awards.

[484] Michigan Department of Environment, Great Lakes, and Energy. "Michigan school districts to see more clean and electric school buses with $24M investment from Bipartisan Infrastructure Law." May 30, 2024. Available at https://www.michigan.gov/egle/newsroom/press-releases/2024/05/30/electric-school-buses.

[485] U.S. Environmental Protection Agency. "Clean School Bus Program Guide." May 2022. Available at https://nepis.epa.gov/Exe/ZyPDF.cgi/P1014WNH.PDF?Dockey=P1014WNH.pdf.

[486] U.S. Department of Transportation. Federal Transit Administration. "Fiscal Year 2020 Low or No-Emission (Low-No) Bus Program Projects." Accessed June 2024. Available at https://www.transit.dot.gov/funding/grants/fiscal-year-2020-low-or-no-emission-low-no-bus-program-projects.

[487] CATA. "Beyond the Bus: Electrifying CATA's Fleet." June 2023. Available at https://www.cata.org/blog/electrifying-catas-fleet.

[488] City of Detroit. Department of Transportation. "DDOT Deploys Four Electric Buses as Part of Charge for Greener Operations." May 2022. Available at https://detroitmi.gov/news/ddot-deploys-four-electric-buses-part-charge-greener-operations.

[489] Fisher, A. University of Michigan. "Four Electric Buses a Step Toward Cleaner Campus Fleet." *The University Record.* June 2023. Available at https://record.umich.edu/articles/four-electric-buses-a-step-toward-cleaner-campus-fleet/.

[490] Quarles, N., *et al.* "Costs and Benefits of Electrifying and Automating Bus Transit Fleets." *Sustainability.* 2020. 12(10), 3977. Available at https://doi.org/10.3390/su12103977.

[491] Amazon. "Everything You Need to Know About Amazon's Electric Delivery Vans From Rivian." April 2024. Available at https://www.aboutamazon.com/news/transportation/everything-you-need-to-know-about-amazons-electric-delivery-vans-from-rivian#:~:text=To%20date%2C%20Amazon's%20vans%20from,to%20customers%20in%20the%20U.S.&text=The%20Package%20Decision%20Engine%2C%20an,damage%20and%20making%20deliveries%20easier.

RECOMMENDATION

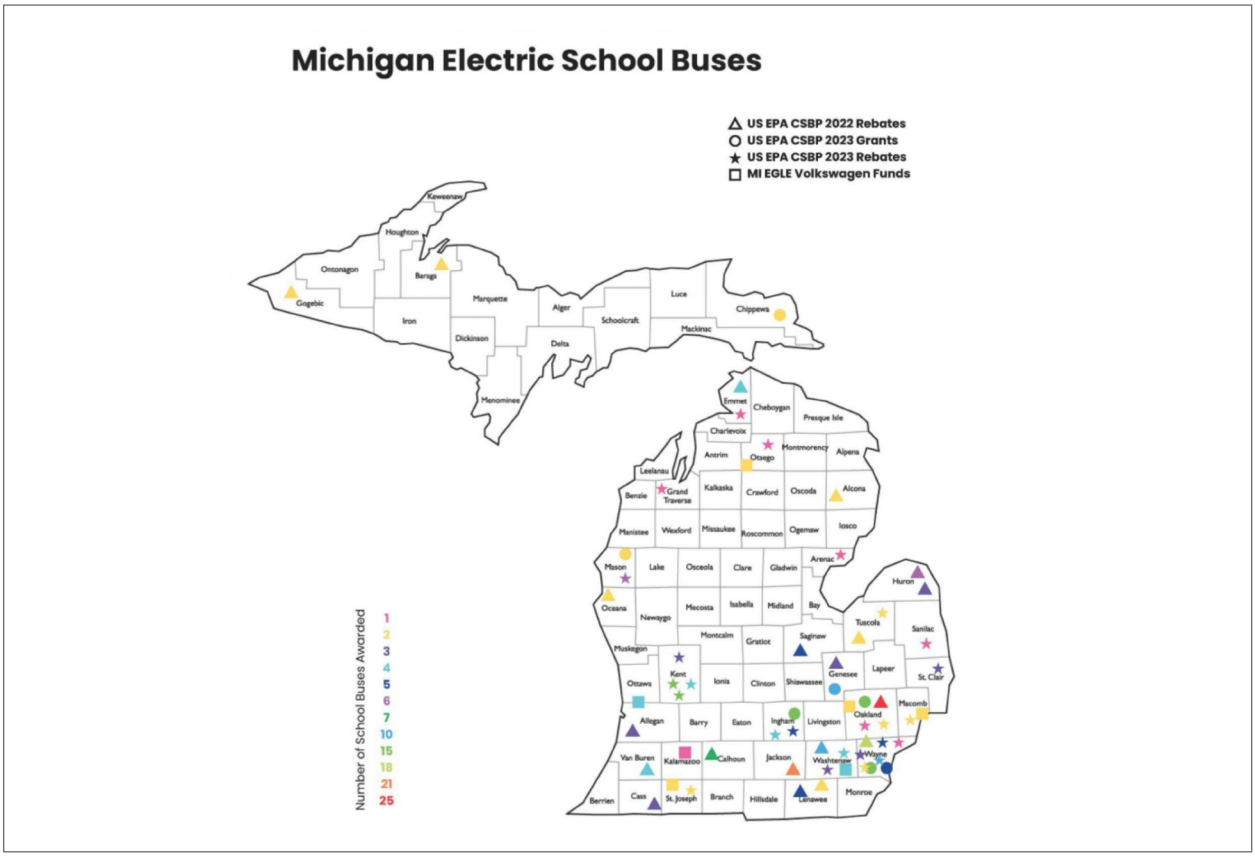
Pass new legislation establishing tax credits for local businesses, to transition from ICE vehicles to EVs, paired with technical support for entities located in DACs and rural areas.

Overcoming Barriers to Adoption

The barriers for adoption of MHD EVs mirror those of the passenger vehicle segment, oftentimes to a greater degree. The higher costs of MHD EVs compared to their ICE counterparts pose a significant barrier for fleet operators, particularly those with limited capital budgets or requirements for certain ROI timelines. Fortunately, unlike the light-duty passenger vehicle sector, there are a sizable number of funding opportunities available to help deploy MHD EVs in Michigan.

- ***U.S. EPA Clean School Bus Program:*** As discussed above, Michigan school districts have been extremely successful in applying for and winning awards from the U.S. EPA Clean School Bus Program. In fact, with more than $70 million in awards for Michigan school districts, Michigan is ranked second in terms of dollar amount awarded from the program, trailing only California.[492]

Figure 28: *Map of electric school bus deployments in Michigan*[493, 494]



[492] U.S. Environmental Protection Agency. "Clean School Bus Program Awards." Accessed June 2024. Available at https://www.epa.gov/cleanschoolbus/clean-school-bus-program-awards.

[493] Figure created by the Environmental Law and Policy Center. Deployments mapped are based on information as of June 2024.

[494] U.S. Environmental Protection Agency. "Clean School Bus Program Awards." Accessed June 2024. Available at https://www.epa.gov/cleanschoolbus/clean-school-bus-program-awards.

- ***Michigan School Bus Energy Grant Program:*** After the first round of rebates for the U.S. EPA Clean School Bus Program, 58 Michigan school districts that applied for funding were not selected, the majority of which are classified as mid-high or high-poverty school districts by the U.S. Department of Education.[495] Recognizing the interest of school districts in adding electric school buses in their fleets, in the FY 2024 state budget, the Michigan Legislature included $125 million to fund a Michigan clean school bus grant program. The first round of funding was announced in July 2024, awarding $30 million to 29 school districts.[496] Access to state-level funding is providing more districts with the opportunity to adopt ESBs and make Michigan school districts more competitive in applying for the U.S. EPA funding, ensuring Michigan continues to be a top recipient of federal awards.

- ***Michigan Fuel Transformation Program:*** The Michigan Fuel Transformation Program supports the replacement of qualifying diesel vehicles with cleaner alternatives that have low to no emissions. The program is supported by funds made available through Michigan's $64.8 million allocation of Volkswagen Settlement funds (as described in *Section 4.3*). The program has supported the deployment of ESBs and electric MHD trucks and transit buses. To date, 38 grants have been awarded, responsible for 7,829 metric tons of carbon dioxide (CO2) emissions reductions and 67.5 metric tons of NOx emissions reductions.[497]

- ***Michigan Clean Diesel Program:*** The Michigan Clean Diesel Program offers grants to replace diesel vehicles with all-electric vehicles, focusing on local government fleets, recycling and waste vehicles, and agriculture equipment.[498]

These funding opportunities are crucial to overcoming the higher costs that currently exist for MHD EVs in comparison to ICE alternatives. However, there is more to be done to support deployment of MHD vehicles in Michigan. Targeted incentives that build on those detailed above will provide operators of MHD vehicles the opportunity to transition their vehicles to zero-emission alternatives.

[495] Clean Fuels Michigan. "Electrifying Michigan's School Buses." Accessed June 2024. Available at https://cleanfuelsmichigan.org/wp-content/uploads/2023/06/Electric-School-Buses-and-Low-Income-and-Rural-Communities.pdf.

[496] Michigan Department of Education. "Local School Districts Receive $30M from Michigan Department of Education for Clean School Buses." Accessed August 2024. Available at https://www.michigan.gov/mde/news-and-information/press-releases/2024/07/31/30m-from-michigan-department-of-education-for-clean-school-buses#:~:text=The%20funding%20from%20Michigan's%20Clean,of%20Environment%2C%20Great%20Lakes%2C%20and.

[497] Michigan Department of Environment, Great Lakes, and Energy. "Fuel Transformation Program." Accessed June 2024. Available at https://www.michigan.gov/egle/about/organization/materials-management/fuel-transformation-program.

[498] Michigan Department of Environment, Great Lakes, and Energy. "Michigan Clean Diesel Program." Accessed June 2024. Available at https://www.michigan.gov/egle/about/organization/materials-management/pollution-prevention/transportation/clean-diesel-initiative.

National Zero-Emission Freight Corridor Strategy

In 2024, the Joint Office of Energy and Transportation unveiled the National Zero-Emission Freight Corridor Strategy.[499] The strategy intends to align and accelerate cross-sector investments in zero-emission MHD vehicle infrastructure and signal the need to bolster planning to achieve a zero-emission freight network by 2040. The plan identifies Detroit as a priority hub for the strategy, and I-94 and I-75 are identified as priority corridors in the first of four phases of the strategy.[500] By targeting key transportation corridors across the nation, the strategy aims to optimize resources and infrastructure investments, laying the groundwork for a comprehensive and interconnected zero-emission freight network. Additionally, the strategy seeks to provide clear market signals, foster collaboration among stakeholders and jurisdictions, and stimulate sustainable market growth for zero-emission MHD vehicles. Policymakers in Michigan should support financial incentives and planning that aligns with the strategy to support the deployment of MHD EVs in Michigan. Michigan can complement and leverage this federal strategy to position itself at the forefront of sustainable logistics innovation.

Regional Electric Vehicle (REV) Midwest Plan

In 2021, the governors of Illinois, Indiana, Michigan, Minnesota, and Wisconsin signed an MOU to accelerate vehicle electrification in the Midwest with a specific focus on accelerating medium- and heavy-duty fleet electrification for interstate travel.[501] This collaborative effort is an important forum to demonstrate Michigan's leadership in MHD vehicle electrification and ensure regional alignment. Other regional efforts, notably the REV West plan, have been successful in coordinating policies between states to ensure that interstate transportation corridors establish voluntary minimum standards for EV charging stations.[502] State leaders in Michigan should continue to use the REV Midwest collaborative as an opportunity to develop a comprehensive regional charging network that can facilitate electrified interstate freight travel and commerce.

[499] U.S. Department of Energy. Alternative Fuels Data Center. "National Zero-Emission Freight Corridor Strategy." Accessed June 2024. Available at https://afdc.energy.gov/laws/13413.

[500] Chu, K., *et al.* Joint Office of Energy and Transportation. "*National Zero-Emission Freight Corridor Strategy.*" March 2024. Available at https://driveelectric.gov/files/zef-corridor-strategy.pdf.

[501] U.S. Department of Energy. Alternative Fuels Data Center. "REV Midwest Plan." Accessed July 2024. Available at https://afdc.energy.gov/laws/12708.

[502] U.S. Department of Energy. Alternative Fuels Data Center. "REV West Plan." Accessed July 2024. Available at https://afdc.energy.gov/laws/11875.

SECTION 6: CURRENT STATE OF TRANSPORTATION ELECTRIFICATION: GRID READINESS AND RELIABILITY

As EV adoption increases and until private investments in public charging infrastructure are economically viable without incentives, utilities will play a critical role in the build-out of public charging infrastructure, especially where charging infrastructure can help optimize the grid for all Michiganders. While NEVI funding is largely focused on establishing a network of DCFC along AFCs, utilities can fill in other key electrification infrastructure gaps - making charging more accessible at home, at work, and in public. Consequently, it is critical to ensure that the electric grid can successfully integrate the additional expected load, which is predicted to be as large as 1,500 terawatt-hours (TWh) nationwide by 2050 from EVs.[503] Load management techniques, such as TOU rates and managed charging, can significantly enhance the integration of new load from EVs onto the grid without the need for additional upgrades. However, to ensure capacity for high power DCFC and large load charging sites (e.g., fleet charging depots), it is often necessary to upgrade distribution, and possibly even transmission grid infrastructure, and to streamline the processes related to new electric service.

Section 6.1: Transmission

The transmission network is the backbone of our electric grid. It reaches thousands of miles and connects thousands of electric generators to millions of end users in the U.S. and Canada.[504] After electricity is generated, the transmission network works much like a road system, carrying electric power at a high voltage over long distances. Then, electricity moves to subtransmission lines and subsequently to distribution lines, where electricity flows to customers. EV chargers typically connect to the grid at this last step, but there is recent research and development efforts to connect directly to the transmission network to enable even more charging capacity. For example, although it was ultimately denied, in 2021, ITC Holdings Corp. submitted a pilot to the Federal Energy Regulatory Commission (FERC) to conduct transmission upgrades to enable transportation electrification fleet hubs.[505] And in early 2024, Portuguese companies REN and ATLANTE established a partnership to develop the world's first EV fast-charging stations directly powered from high-voltage lines.[506]

While essential to our daily lives, the process of building transmission lines happens infrequently - Michigan, for example, has not had an interstate transmission line built in the state in about 50 years. However, the growth in renewable energy and electrification of buildings and transportation necessitates the build-out of transmission infrastructure.

A growing problem is congestion of the transmission interconnection queues, which is the collection of projects requesting to connect to the power grid. Wait times are on the rise and most projects that apply for interconnection are ultimately withdrawn. The time from request to operation increased from <2 years for projects built in 2000-2007 to over 4 years for those built in 2018-2023.[507]

Michigan also has one of the nation's least reliable power grids,[508] ranking as one of the worst states for weather-related power outages from 2000 to 2023.[509] While additional transmission buildout alone will not solve this issue, proper reliability

[503] Martin, L., *et al.* RMI. "Electrification 101: Getting the Grid Ready for an EV Revolution." November 2023. Available at https://rmi.org/electrification-101-getting-the-grid-ready-for-an-ev-revolution/.

[504] Staff of the Federal Energy Regulatory Commission. "Report on Barriers and Opportunities for High Voltage Transmission." 2020. p. 6. Available at https://www.congress.gov/116/meeting/house/111020/documents/HHRG-116-II06-20200922-SD003.pdf.

[505] Federal Energy Regulatory Commission Order. "Docket No. ER21-424-000: Order Denying Application for Authorization to Recover Costs Associated with an Electric Vehicle Infrastructure Pilot Project." April 15, 2021. Available at https://www.ferc.gov/media/er21-424-000-041521.

[506] REN and ATLANTE. "Partnership to Develop Five Projects Using Speed-E Grid Connection Solution." February 2024. Available at https://www.ren.pt/en-gb/media/news/ren-and-atlante-establish-partnership-to-develop-five-projects-using-the-speed-e-grid-connection-solution.

[507] Rand, J., *et al.* Lawrence Berkeley National Laboratory. "Queued Up: 2024 Edition Characteristics of Power Plants Seeking Transmission Interconnection." April 2024. Available at https://emp.lbl.gov/queues.

[508] Citizens Utility Board. "Utility Performance Report: Ranking Michigan Among the States." 2022. Available at https://www.cubofmichigan.org/utility_performance_report_2022_edition.

[509] Climate Central. "Weather-related Power Outages Rising." April 2024. Available at https://www.climatecentral.org/climate-matters/weather-related-power-outages-rising.

planning and infrastructure improvements are a big part of ensuring the grid is prepared for increased electrification. Transmission infrastructure plays an important role in maintaining grid reliability, bolstering grid resilience, addressing variable energy resource integration, and reducing costs.[510]

The Midcontinent Independent System Operator (MISO), which covers most of Michigan, has been actively responding to the needs of the changing energy landscape, initiating its Long-Range Transmission Plan (LRTP) in 2022. This is a group of four planned phases, or tranches, with Tranche 1 representing a $10.3 billion investment of 18 projects in the Midwest region.[511] In developing its detailed business case for the portfolio, MISO estimated that Michigan's share of the net economic savings from the new transmission lines is $3.4 billion over 20 years.[512] While the LRTP projects are the largest portfolio of long-range transmission projects in RTO history, there is still more work ahead, especially with increasing loads including from transportation electrification.

Section 6.2: Michigan Public Service Commission

The MPSC is an executive branch agency under LARA whose mission is "to serve the public by ensuring safe, reliable, and accessible energy and telecommunications services at reasonable rates."[513] The MPSC regulates issues related to natural gas and pipelines, electricity, and telecommunications and is responsible for regulation of electric generation and distribution for the seven IOUs in Michigan. The MPSC does this through contested case dockets as well as open workshops and open dockets on issues including distribution system planning, grid modernization, and electric vehicle charging infrastructure. For example, in 2017, the MPSC opened a docket (Case No. U-18368[514]) to begin technical conferences to discuss issues related to EVs and public charging stations. In addition to these formal Commission proceedings, over the last seven years, Michigan EIBC and IEI, recently in collaboration with Clean Fuels Michigan, have held approximately 14 stakeholder convenings focused on a wide variety of issues related to EV and EVSE deployment including details of utility pilot programs, customer education and awareness, federal funding opportunities, public charging infrastructure, fleet electrification, and rate design.[515, 516]

Section 6.3: Distribution Upgrades

As Michigan and the country moves toward decarbonization through the electrification of the grid, transportation, and buildings, reliability of the electric grid will become more and more important. However, according to the Citizen's Utility Board of Michigan, which annually reviews reliability metrics for Michigan's utilities, Michigan exhibits less reliable electric

[510] U.S. Department of Energy. "National Transmission Needs Study." October 2023. p. 52. Available at https://www.energy.gov/gdo/national-transmission-needs-study.

[511] Midcontinent Independent System Operator. "MTEP21 Report Addendum Long Range Transmission Planning Tranche 1 Executive Summary." 2022. p. 1. Available at https://cdn.misoenergy.org/MTEP21%20Addendum-LRTP%20Tranche%201%20Report%20with%20Executive%20Summary625790.pdf.

[512] Midcontinent Independent System Operator. "LRTP Tranche 1 Portfolio Detailed Business Case." 2022. p. 56. Available at https://cdn.misoenergy.org/LRTP%20Tranche%201%20Detailed%20Business%20Case625789.pdf.

[513] Michigan Public Service Commission. Accessed June 2024. Available at https://www.michigan.gov/mpsc.

[514] Michigan Public Service Commission Order. "Docket No. U-18368: In the Matter to Open a Docket That Will Be Used to Collaboratively Consider Issues Related to Both the Deployment of Plug-in Electric Vehicle Charging Facilities and to Examine Issues Germane to the Use of Compressed Natural Gas as a Motor Vehicle Transportation Fuel in Michigan in a Commission Sponsored Technical Conference." April 28, 2017. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/068t0000001UY8hAAG.

[515] Institute for Energy Innovation. "The foundation for Michigan's advanced mobility future: Administrative Actions to Electrify Transportation in Michigan." December 2019. Available at https://k4o441.p3cdn1.secureserver.net/wp-content/uploads/2019/12/19.12.16-IEI_Administrative-Actions-EV-Report_FINAL.pdf.

[516] Michigan Energy Innovation Business Council. "Electric Vehicle Convenings: Report and Next Steps." September 2018. Available at https://k4o441.p3cdn1.secureserver.net/wp-content/uploads/2018/09/EVreportFINAL_09_2018.pdf?time=1715185090.

service than neighboring states.[517] To address these issues, Michigan's utilities are making significant investments with the goal of providing more reliable electric service.[518, 519]

With respect to transportation electrification, it is expected that the early impacts of increased deployment of EVs on the grid will first emerge at the "grid edge," in close proximity to customers (e.g., on residential distribution lines and distribution transformers).[520] Michigan's utilities are working to predict the necessary locations of these upgrades and making investments in the distribution system in advance of increased EV load. For example, DTE Energy estimates that over the time frame of their current distribution system plan (2024 - 2028), "approximately $189 million of distribution investment will be needed for utility make-ready work to connect the chargers required to support EV adoption."[521]

RECOMMENDATION

Encourage utilities to conduct EV load forecasting in a granular manner that allows for "no regrets" investments to mitigate grid constraints at anticipated congestion points.

However, because Michigan's utility distribution system plans and transportation electrification plans (see *Section 6.5*) are not evaluated as contested cases at the MPSC, the investments necessary to upgrade each utility's distribution grid, including those needed to enable transportation electrification, are approved in general electric rate cases. This can create challenges for advanced planning and approval of future investments, especially given the long time-lag for key grid components, like transformers. States like Colorado are addressing these challenges with recently passed legislation (Senate Bill 218) which allows utilities to pre-order needed equipment (such as transformers and switchgear), requires five-year distribution system plans, establishes interconnection timelines, and creates a pathway for distribution upgrades and more fair cost allocation.[522]

Section 6.4: Rate Design

Demand Charges

Although most EV charging happens at residential homes, public DCFC infrastructure is essential to enabling long-distance travel and, according to studies,[523] is critical for reducing range anxiety for new customers. However, because DCFCs are more expensive to install and utilization rates are currently low, it can be difficult to establish a workable business case for these investments. This can be especially challenging if the electric tariff includes demand charges. Demand charges are

[517] Citizens Utility Board of Michigan. "The ABCs of Michigan EVs: A Policy Guide to Electrify Michigan." Accessed June 2024. p. 2. Available at https://d3n8a8pro7vhmx.cloudfront.net/cubofmichigan/pages/1232/attachments/original/1639585755/The_ABCs_of_Michigan_EVs_Final_for_Website.pdf?1639585755.

[518] Consumers Energy. Case No. U-20147. "Consumers Energy Electric Distribution Infrastructure Investment Plan ("EDIIP") 2024-2028." September 2023. p. 53. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000A3A9WAAV.

[519] DTE Energy. Case No. U-21538. "DTE Energy Company's Transportation Electrification Plan." January 2024. p. 30. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000BUT09AAH.

[520] *Ibid.*

[521] *Ibid.*

[522] Colorado Legislature. Senate Bill 218. 2024. Available at https://leg.colorado.gov/bills/sb24-218.

[523] Li, S., *et al.* "The Market for Electric Vehicles: Indirect Network Effects and Policy Design." *Journal for the Association of Environmental and Resource Economists.* Volume 4, Number 1. March 2017. Available at https://www.journals.uchicago.edu/doi/full/10.1086/689702.

assessed for commercial and industrial users based on their peak usage each month – whether or not that peak usage aligns with the coincident peak on the system (and, thereby, whether or not the customer's peak usage contributes to the overall system costs).[524] These demand charges often exceed income from charging at public DCFC stations and can make it uneconomical to host such a station.[525, 526, 527]

Because of these challenges, utilities across the country have proposed alternatives to the traditional demand charge structure including temporary reduction or elimination of demand charges, maximum demand charge fees (capped in terms of energy consumption), and subscription plans for DCFC services.[528] For example, DTE Energy currently allows DCFC to take service under a commercial rate that is volumetric and does not have a demand charge by waiving the existing 1,000 kW demand limit for this rate schedule only for DCFCs. This option was recently extended until June 2026 with DCFCs energized after June 2024 permitted to remain on that rate schedule for two years.[529]

RECOMMENDATION

Support policies to waive demand charges for DCFC until utilization rates increase sufficiently.

It is important to remember when considering these alternatives that EVs are benefitting and will continue to benefit all ratepayers with lower electricity rates, reductions in local air pollution, and reduced greenhouse gas emissions.[530] For example, considering just the cost savings alone, DTE Energy estimates that its TEP portfolio will provide $56 million in rate relief for DTE Energy customers from the 2025 - 2028 investments.[531] As such, it is not necessary to utilize demand charges to recover costs to the system – instead, these rate structures which reduce or avoid demand charges produce significant savings over the longer term by enabling increased EV adoption.

Time of Use Rates

Over the last several years, Michigan's utilities have gradually transitioned residential and commercial customers to TOU electricity rates. These rates seek to better align pricing to customers with electricity costs, incentivizing customers to use electricity when the cost to produce it is lower and lower electricity use when the cost to produce it is higher. TOU rates typically include two or three pricing periods with an on-peak period during daytime hours and an off-peak period overnight and on weekends. These periods and/or rates may vary between summer and winter depending on seasonal load changes.

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[524] LeBel, M., *et al.* "Demand Charges: What are they Good For?" Regulatory Assistance Project. November 2020. Available at https://www.raponline.org/knowledge-center/demand-charges-what-are-they- good-for.

[525] Great Plains Institute and Midcontinent Transportation Electrification Collaborative. "Analytical White Paper: Overcoming Barriers to Expanding Fast Charging Infrastructure in the Midcontinent Region." July 2019. Available at https://scripts.betterenergy.org/reports/GPI_DCFC_Analysis_July_2019.pdf.

[526] Fitzgerald, G. and C. Nelder. RMI. "EVGo Fleet and Tariff Analysis – Phase 1: California." April 2017. Available at https://rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf.

[527] National Association of State Energy Officials, Western Interstate Energy Board, and Utah Clean Cities. "Demand Charges & EV Fast Charging: An Intermountain West Assessment." October 2021. Available at https://www.naseo.org/data/sites/1/documents/publications/Demand%20Charges%20and%20EV%20Charging%20-%20Final.pdf.

[528] *Id.* p. 4.

[529] Michigan Public Service Commission Order. "Docket No. U-21297: In the Matter of the Application of DTE Energy for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy, and Miscellaneous Accounting Authority." December 1, 2023. p. 341. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000At0VBAAZ.

[530] American Lung Association. "The Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles." 2020. Available at https://www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf.

[531] DTE Energy. Case No. U-21534. "Direct Testimony of Pina Bennett on Behalf of DTE Energy." 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CkNXIAA3.

For example, Consumers Energy has two residential TOU rates, Nighttime Savers (which is preferred for EV customers) and Residential Smart Hours. Nighttime Savers has three pricing periods: super off-peak (11pm - 6am), off-peak (6am - 2pm and 7pm - 11pm), and on-peak (2pm - 7pm) whereas Residential Smart Hours has two pricing periods: off-peak (7pm - 2pm) and on-peak (2pm - 7pm).[532] The pricing for these periods varies between the summer months (June 1 - September 30) and winter months (October 1 - May 31).

Many utility EV programs, including those in Michigan, include efforts to shift EV load from on-peak to off-peak times using TOU rates specifically designed for EV charging (like the Nighttime Savers rate described above). This is called "passive managed charging" in that the utility does not actively control when an EV is being charged, but instead provides price signals to shift customer behavior to charging at desired times. This allows utilities to reduce costs by avoiding unnecessary upgrades and generation investments while utilizing already existing capacity. For example, Consumers Energy's PowerMIDrive program requires recipients of residential EV charging rebates to enroll in either a whole-home TOU rate or an EV-specific TOU rate.[533] According to the 2023 PowerMIDrive Annual Report, as a result of these requirements, 95.7% of residential charging occurs off-peak.[534] DTE Energy also requires customers to enroll in a TOU rate to qualify for a home charger rebate. According to DTE's 2023 EV Status Report, 92% of residential charging occurred outside of peak hours (i.e., outside of 3 pm - 7 pm)[535] and 84% of customers indicated that the EV charger rebate "somewhat" or "very much" influenced their decision to sign up for a TOU rate.[536]

RECOMMENDATION

Support alternative and complementary approaches to time-of-use rate design, such as active managed charging, to optimize grid load and maximize customer benefits while minimizing new capital expenditures.

To ensure that TOU rates are effective in shifting customer behavior, it is important that these rates are easy to understand for customers and well-explained by a utility's education program.[537] Several utilities provide cost comparison estimates to show what a customer's bill would be under different rate plans. These estimates can be helpful to translate complicated rate options into monthly bills that a customer can more easily understand.

It is also important to consider that simple TOU rates, while effective at shifting residential charging to overnight hours, may ultimately need to be modified or scrapped in favor of actively managed charging options. For one thing, as EV penetration increases, using TOU rates to shape load may become inadequate. This is because at high EV penetration levels, if most vehicles begin to charge at the beginning of the low-price period, the surge in demand may not be tenable for generation ramping or for power flow stability. In addition, as solar and wind energy become increasingly important in power supply, grid stress will be associated with periods of lower renewable generation relative to load. These periods will not be consistent with current TOU rates as to season or time of day. At some point in the future, it will therefore be necessary to move from TOU rates toward more sophisticated load-shaping strategies for EVs, which are likely to include some level of communications from the utility to either charging infrastructure or vehicles. Michigan's utilities are initiating pilot projects to test these more

[532] Consumers Energy. Case No. U-21224. "2023 PowerMIDrive Program Annual Report." June 2023. p. 29. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000008L9UaAAK.

[533] *Id.* p. 8.

[534] *Id.* p. 5.

[535] DTE Energy. Case No. 20162. "DTE Energy's 2023 EV Status Report." August 2023. p. 23. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000008zvXdAAI.

[536] *Id.* p. 16.

[537] Citizens Utility Board of Michigan. "The ABCs of Michigan EVs: A Policy Guide to Electrify Michigan." Accessed June 2024. pp. 23-24. Available at https://d3n8a8pro7vhmx.cloudfront.net/cubofmichigan/pages/1232/attachments/original/1639585755/The_ABCs_of_Michigan_EVs_Final_for_Website.pdf?1639585755.

sophisticated managed charging technologies. For example, DTE Energy is working with OEMs, Tesla, and WeaveGrid on the DTE Smart Charge pilot which involves utilizing vehicles to respond to demand response events and, in the current phase, initiating managed EV charging only when it is cheapest for the customer and most beneficial to the system.[538]

Section 6.5: Transportation Electrification Plans (TEPs)

U.S. state public utility commissions (PUCs) approved increased funding for transportation electrification programs from $60 million in 2020 to $460 million in 2021.[539] Nearly 45%, or $205.2 million, of that total is attributed to the six year program approval by the New Jersey Board of Public Utilities for the Public Service Electric and Gas Company (PSE&G).[540, 541] PSE&G's approved programs are expected to support the installation of 40,000 residential chargers, 3,500 commercial chargers, 1,000 DCFC, as well as distribution upgrades.[542] Since 2021, the number of BEVs on NJ roads has nearly tripled, with EVs accounting for 11.6% of new vehicle sales in March 2024, indicating the value of utility transportation electrification investment in spurring increased EV adoption.[543] Although many utility EV programs nationwide started as experimental pilots, utility transportation electrification programs have grown in sophistication, size, and impact, as demonstrated by the New Jersey example. Consequently, more and more IOUs are filing TEPs with their regulatory authorities.

TEP proposals detail a utility's planned investment to meet its service territory's expected electrification demand growth and are typically evaluated, by individual program or holistically, according to the costs incurred and benefits provided to all customers within the IOU's service territory. According to a Synapse Energy Economics study examining the revenues and costs associated with EVs between 2011 and 2021, EV drivers have contributed about $18 million more than their associated costs in both Illinois[544] and Virginia,[545] $26.7 million more in Colorado,[546] and $85.3 million more in New Jersey.[547] In Colorado and New Jersey, when utility expenditures on EV programs are included in costs, the net revenue still exceeds costs by approximately $15.7 and $62.7 million, respectively. To accurately capture this value, it is therefore imperative that utilities fully account for all benefits and clearly indicate any and all assumptions made in their analyses.

The State of TEPs in Michigan

In 2017, the MPSC began an effort to explore transportation electrification and utility EV pilot programs.[548] Subsequently, five of Michigan's IOUs received approval for EV pilot programs. For example, Consumers Energy's PowerMIDrive program was

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[538] DTE Energy. Case No. 20162. "DTE Energy's 2023 EV Status Report." August 2023. p. 33. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000008zvXdAAI.

[539] Lepre, N. Atlas Public Policy. "Electric Utility Filing Bi-Annual Update." November 2021. Available at https://atlaspolicy.com/wp-content/uploads/2021/11/Electric-Utility-Filing-Bi-Annual-Brief-2021a.pdf.

[540] *Ibid.*

[541] State of New Jersey Board of Public Utilities. "Docket No. E018101111: Decision and Order Approving Stipulation – In the Matter of the Petition of the Public Service Electric and Gas Company for Approval of its Clean Energy Future – Electric Vehicle and Energy Storage ("CEF-EVES") Program on a Regulated Basis." January 2021. Available at https://publicaccess.bpu.state.nj.us/DocumentHandler.ashx?document_id=1233230.

[542] Walton, R. "New Jersey Oks PSE&G $166M EV Infrastructure program, omits heavy duty vehicles." *Utility Dive.* January 2021. Available at https://www.utilitydive.com/news/new-jersey-oks-psegs-166m-ev-infrastructure-program-omits-heavy-duty-ve/594111/.

[543] New Jersey Department of Environmental Protection. "Drive Green – NJ Electric Vehicle Data." Accessed July 2024. Available at https://dep.nj.gov/drivegreen/nj-ev-data/.

[544] Shenstone-Harris, S., *et al.* Synapse Energy Economics, Inc. "Electric Vehicles are Driving Rates Down for All Customers, State Factsheet: Illinois." April 2024. Available at https://www.synapse-energy.com/sites/default/files/Electric%20Vehicles%20Are%20Driving%20Rates%20Down%20for%20All%20Customer%20Illinois%20May%202024.pdf.

[545] Shenstone-Harris, S., *et al.* Synapse Energy Economics, Inc. "Electric Vehicles are Driving Rates Down for All Customers, State Factsheet: Virginia." April 2024. https://www.synapse-energy.com/sites/default/files/Electric%20Vehicles%20Are%20Driving%20Rates%20Down%20for%20All%20Customer%20Virginia%20May%202024%2024-023.pdf.

[546] Shenstone-Harris, S., *et al.* Synapse Energy Economics, Inc. "Electric Vehicles are Driving Rates Down for All Customers, State Factsheet: Colorado." April 2024. https://www.synapse-energy.com/sites/default/files/Electric%20Vehicles%20Are%20Driving%20Rates%20Down%20for%20All%20Customer%20Colorado%20May%202024.pdf.

[547] Shenstone-Harris, S., *et al.*Synapse Energy Economics, Inc. "Electric Vehicles are Driving Rates Down for All Customers, State Factsheet: New Jersey." April 2024. https://www.synapse-energy.com/sites/default/files/Electric%20Vehicles%20Are%20Driving%20Rates%20Down%20for%20All%20Customer%20New%20Jersey%20April%202024.pdf.

[548] Michigan Public Service Commission Order. Case No. U-18368. "Order Commencing a Collaborative Technical Conference." April 28, 2017. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/068t0000001UY8hAAG.

launched in mid-2019 as a three-year pilot.[549] DTE Energy's Charging Forward EV pilot program was also approved in 2019.[550] Over the last several years, at the urging of stakeholders and the Commission, elements of these utility pilot programs have been gradually approved as permanent programs. For example, in December 2023, the Commission approved DTE Energy's proposal to make three pilot program elements permanent – education and outreach, home charger installation, and the eFleet Battery Support program.[551] In that case, DTE Energy indicated that it was developing a comprehensive TEP detailing the company's plans for its EV-related investments through 2028.

Subsequently, also in December 2023, the Commission opened a docket (Case No. U-21538) to receive DTE Energy's TEP and allow for meaningful stakeholder review outside of a general electric rate case.[552] In Case No. U-21492, the Commission directed Consumers Energy to file a TEP, and ordered the Commission Staff to develop and file a proposed TEP filing process that includes "minimum filing requirements for each TEP submission, minimum expectations for public engagement…and a proposed schedule for filings in this docket," by July 1, 2024.[553] The resulting Commission Staff proposal states that a TEP "must seek to maximize the overall benefits of electric vehicles and other electrified transportation while minimizing overall costs," and details a TEP's minimum requirements.[554] The Commission will take stakeholder feedback on that draft filing and, presumably, establish filing requirements for future utility TEPs.

Legislative and Commission Influence

According to Atlas Public Policy, as of 2020, utilities in 34 states have filed TEPs.[555] Of them, nine states, via either legislation or PUC order, have required utilities to file TEPs.[556, 557] Legislation, PUC order, or a combination of the two, serve as the most common pathways to require utility TEP filings (Table 10).

[549] Michigan Public Service Commission Order. "Docket No. U-20134: In the Matter of the Application of Consumers Energy Company for Authority to Increase its Rates for the Generation and Distribution of Electricity and for other Relief." January 9, 2019. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/068t00000036VWMAA2.

[550] Michigan Public Service Commission Order. "Docket No. U-20162: In the Matter of the Application of DTE Electric Company for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy and For Miscellaneous Accounting Authority." May 2, 2019. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/068t0000004SM3yAAG.

[551] Michigan Public Service Commission Order. "Docket No. U-21297: In the Matter of the Application of DTE Energy Company for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy, and for Miscellaneous Accounting Authority." December 1, 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000At0VBAAZ.

[552] Michigan Public Service Commission. "Docket No. U-21538." December 21, 2023. Available at https://mi-psc.my.site.com/s/case/5008y000009ZFgYAAW/in-the-matter-on-the-commissions-own-motion-to-open-a-docket-for-certain-regulated-electric-utilities-to-file-transportation-electrification-plans-and-for-other-related-matters.

[553] Michigan Public Service Commission. "Docket No. U-21492: In the Matter to Open a Docket that will be Used to Collaboratively Consider and Address Issues and Concerns Related to Use and Deployment of Electric Vehicles in a Commission-sponsored Technical Conference." March 15, 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CW7TZAA1.

[554] Michigan Public Service Commission. "Michigan Transportation Electrification Plan Filing Requirements: Pursuant to Case No. U-21492." July 1, 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000EP4nWAAT.

[555] Nigro, N. Atlas Public Policy. "Investment in Publicly Accessible EV Charging in the United States (2023)." May 2023. Available at https://atlaspolicy.com/wp-content/uploads/2023/05/Investment-in-Publicly-Accessible-EV-Charging.pdf.

[556] *Ibid.*

[557] Huether, P., *et al.* American Council for an Energy-Efficient Economy. "Utility Transportation Electrification Planning – Emerging Practices to Support EV Deployment." September 2022. https://www.aceee.org/sites/default/files/pdfs/t2201.pdf.

Table 10: *States with Transportation Electrification Plan requirements*

State	Requirement Mechanism	Incentive Offered
Arizona	PUC Order	ACC Decision No. 77289 ordered utilities to develop long-term, comprehensive TEPs.[558]
California	Legislation	SB 350 required utilities to submit detailed transportation electrification plans in their IRPs and directs the California PUC to approve comprehensive investment plans that accelerate transportation electrification.[559]
Colorado	Legislation	SB 19-077 required utilities to file TEPs every three years.[560]
Illinois	Legislation	20 ILCS 627 required utilities to file [TEPs] every three years.[561]
Minnesota	PUC Order	PUC Order Making Findings and Requiring Filings (E-999/CI-17-879) ordered utilities to file TEPs every two years.[562]
New Mexico	Legislation	NM Statutes Chapter (62-8-12) required utilities to file applications to expand TE every two years.[563]
Oregon	Legislation	SB 1547 required utilities to file applications to accelerate TE.[564]
Virginia	Combination	HB 2282 required the Commission to make policy recommendations that would govern utilities to accelerate transportation electrification.[565] SCC Order PUR-2020-00051 required utilities to file TEPs.[566]
Washington	Legislation	HB 1512 allowed utilities to file TEPs to be considered by the state PUC,[567] and HB 1853 called for the development of a statewide transportation electrification strategy.[568]

However, even the same pathway may look different from state to state. In Virginia, for example, the State Corporation Commission required the Commonwealth's two largest IOUs to file TEPs, which would need to include several elements, such as a forecast of EV adoption, the investments required to support it, and how investments would support LI access to transportation electrification.[569] The Minnesota PUC arrived at similar requirements, but did so over a series of PUC orders,

[558] Arizona Corporation Commission. "Docket No. 77289: Electric Vehicle Policy Implementation Plan." July 19, 2019. Available at https://docket.images.azcc.gov/0000199128.pdf?i=1713284364293.

[559] California Legislature. Senate Bill 350. October 2015. Available at http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0301-0350/sb_350_bill_20151007_chaptered.html.

[560] Colorado Legislature. Senate Bill 19-077. May 2019. Available at https://leg.colorado.gov/sites/default/files/documents/2019A/bills/2019a_077_enr.pdf.

[561] Illinois Legislature. 20 ILCS 627. "Electric Vehicle Act." September 2020. Available at https://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3348&ChapterID=5.

[562] Minnesota Public Utilities Commission Order. "Docket No. E-999/CI-17-879: In the Matter of a Commission Inquiry into Electric Vehicle Charging and Infrastructure." February 1, 2019. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={10BBAA68-0000-C413-9799-DF3ED0978E75}&documentTitle=20192-149933-01.

[563] New Mexico Legislature. Electrification 62 (Electric, Gas, and Water Utilities), Article 8 (Duties and Restrictions Imposed Upon Public Utilities), Section 12 (Applications to expand transportation electrification). 2019. Available at https://nmonesource.com/nmos/nmsa/en/4407/1/document.do.

[564] Oregon Legislature. SB 1547, Section 20. March 2016. Available at https://olis.oregonlegislature.gov/liz/2016R1/Downloads/MeasureDocument/SB1547/Enrolled.

[565] Commonwealth of Virginia Legislature. HB 2282. January 2021. Available at https://lis.virginia.gov/cgi-bin/legp604.exe?211+ful+HB2282+pdf.

[566] Commonwealth of Virginia State Corporation Commission Order. "Case No. PUR-2020-00051: Order Directing the Filing of Transportation Electrification Plans." June 15, 2022. Available at https://www.scc.virginia.gov/docketsearch/DOCS/7c4%4001!.PDF.

[567] Washington Legislature. HB 1512. April 2019. https://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/House%20Passed%20Legislature/1512-S.PL.pdf?q=20240712102632.

[568] Washington Legislature. HB 1853. May 2023. Available at https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/Session%20Laws/House/1853-S.SL.pdf?q=20240712103433.

[569] Commonwealth of Virginia State Corporation Commission Order. "Case No. PUR-2020-00051: Order Directing the Filing of Transportation Electrification Plans." June 15, 2022. Available at https://www.scc.virginia.gov/docketsearch/DOCS/7c4%4001!.PDF.

thus the process was more iterative.[570] Different approaches to the same pathway can also be seen in those states whose TEP requirements are enforced by legislation. California,[571] Colorado,[572] Illinois,[573] New Mexico,[574] Oregon,[575] Virginia,[576] and Washington[577, 578] all used legislation to influence their state's PUC and utilities to accelerate transportation electrification. There are differences, however, in what the legislation requires of the PUC. For example, laws in California,[579] Virginia,[580] and Washington[581] task the state PUCs with developing transportation electrification strategies to inform PUC decisions and identify appropriate guidelines. Meanwhile, laws in Colorado,[582] Illinois,[583] New Mexico,[584] and Oregon,[585] all explicitly require their PUCs to direct electric utilities to file TEPs, each providing varying degrees of details on what TEPs should include and how the respective PUC should evaluate them. *Appendix IV* provides more details on several of these TEP PUC orders and laws.

RECOMMENDATION

Pass new legislation to create the statutory authority for utilities to make comprehensive investments in transportation electrification at scale and require that utility TEPs are filed as contested cases with approved plans providing expected cost recovery over the proposed planning horizon.

Common Elements

Regardless of the method by which TEPs are required, TEPs are typically organized by investment portfolio categories (e.g., residential, commercial, public, customer education, and pilot programs) and address charging needs and EV adoption in several key areas or sub-categories (see *Appendix V*). In its TEP filed in January 2024 (Case U-21538),[586] DTE Energy indicates that it conducted a review of six other utility TEPs nationwide: Illinois Commonwealth Edison (ComEd),[587] Consolidated

[570] Minnesota Public Utilities Commission Order. "Docket No. E-999/CI-17-879: In the Matter of a Commission Inquiry into Electric Vehicle Charging and Infrastructure." February 1, 2019. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={10BBAA68-0000-C413-9799-DF3ED0978E75}&documentTitle=20192-149933-01.

[571] California Legislature. Senate Bill 350. October 2015. Available at http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0301-0350/sb_350_bill_20151007_chaptered.html.

[572] Colorado Legislature. Senate Bill 19-077. May 2019. Available at https://leg.colorado.gov/sites/default/files/documents/2019A/bills/2019a_077_enr.pdf.

[573] Illinois Legislature. 20 ILCS 627. "Electric Vehicle Act." September 2020. Available at https://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3348&ChapterID=5.

[574] New Mexico Legislature. Electrification 62 (Electric, Gas, and Water Utilities), Article 8 (Duties and Restrictions Imposed Upon Public Utilities), Section 12 (Applications to expand transportation electrification). 2019. Available at https://nmonesource.com/nmos/nmsa/en/4407/1/document.do.

[575] Oregon Legislature. SB 1547, Section 20. March 2016. Available at https://olis.oregonlegislature.gov/liz/2016R1/Downloads/MeasureDocument/SB1547/Enrolled.

[576] Commonwealth of Virginia Legislature. HB 2282. January 2021. Available at https://lis.virginia.gov/cgi-bin/legp604.exe?211+ful+HB2282+pdf.

[577] Washington Legislature. HB 1512. April 2019. https://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/House%20Passed%20Legislature/1512-S.PL.pdf?q=20240712102632.

[578] Washington Legislature. HB 1853. May 2023. Available at https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/Session%20Laws/House/1853-S.SL.pdf?q=20240712103433.

[579] California Legislature. Senate Bill 350. October 2015. Available at http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0301-0350/sb_350_bill_20151007_chaptered.html.

[580] Commonwealth of Virginia Legislature. HB 2282. January 2021. Available at https://lis.virginia.gov/cgi-bin/legp604.exe?211+ful+HB2282+pdf.

[581] Washington Legislature. HB 1853. May 2023. Available at https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/Session%20Laws/House/1853-S.SL.pdf?q=20240712103433.

[582] Colorado Legislature. Senate Bill 19-077. May 2019. Available at https://leg.colorado.gov/sites/default/files/documents/2019A/bills/2019a_077_enr.pdf.

[583] Illinois Legislature. E20 ILCS 627. "Electric Vehicle Act." September 2020. Available at https://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3348&ChapterID=5.

[584] New Mexico Legislature. Electrification 62 (Electric, Gas, and Water Utilities), Article 8 (Duties and Restrictions Imposed Upon Public Utilities), Section 12 (Applications to expand transportation electrification). 2019. Available at https://nmonesource.com/nmos/nmsa/en/4407/1/document.do.

[585] Oregon Legislature. SB 1547, Section 20. March 2016. Available at https://olis.oregonlegislature.gov/liz/2016R1/Downloads/MeasureDocument/SB1547/Enrolled.

[586] DTE Energy. Case No. U-21538. "DTE Energy Company's Transportation Electrification Plan." January 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000BUT09AAH.

[587] Illinois Commonwealth Edison. "ComEd Beneficial Electrification Plan." 2022. Available at https://icc.illinois.gov/docket/P2022-0432/documents/325766/files/567114.pdf.

Edison Company of New York (ConEd),[588] National Grid of Massachusetts,[589] Southern California Edison Company (SCE) of California,[590] Xcel Energy of Colorado (Xcel Colorado),[591] and Xcel Energy of Minnesota (Xcel Minnesota).[592] Generally, several key themes are present across these TEPs:[593]

1. Most of the TEPs outline investment and programs for a three- to five-year timeframe, which is longer than a typical general rate case bridge and test period;
2. The TEPs can accommodate programmatic changes, as needed, in a dynamic environment;
3. The TEPs generally emphasized L2 charging over DCFC to improve overall customer affordability due to the higher number of use cases for L2 charging, lower installation costs, and minimized grid impact; and
4. The TEPs often include an emphasis on compliance with statewide regulations, equity goals, multi-unit dwelling and fleet segments, supporting functions, and managing incremental EV load.

In addition to the themes noted above, a review of the same TEPs, as well as Ameren Illinois' (Ameren) 2022 TEP,[594] revealed several common elements and data points (Table 11). To accurately capture the full value of utility EV programs, it is imperative that utilities fully account for all costs and benefits in a robust benefit-cost analysis (BCA), including expected benefits to society as a whole. Societal benefits include reduced greenhouse gas emissions, criteria pollutant emissions, noise pollution, and transportation fuel costs, as well as improved physical and mental health, job creation, and economic benefits.[595, 596, 597, 598, 599] A number of these societal benefits,[600] including reduced greenhouse gas emissions and reduced

[588] Consolidated Edison Company of New York, Inc. Case 18-E-0138. "Electric Vehicle Infrastructure Make-Ready Program Implementation Plan." September 2020. Available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b181AB1C0-0F11-44F6-B652-5705D91EC1B3%7d.

[589] Massachusetts Electric Company and Nantucket Electric Company each D/B/A National Grid. "Direct Pre-Filed Testimony of the Electric Vehicle Program Panel." Exhibit NG-EVPP-1. July 2021. Available at https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/13758106.

[590] Southern California Edison Company. "Application of Southern California Edison Company (U338E) for Approval of its Charge Ready 2 Infrastructure and Market Education Programs." Application 18-06-015. September 2020. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K230/346230115.PDF.

[591] Colorado Xcel Energy. "Transportation Electrification Plan: 2021 – 2023." Available at https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/20A-0204E-_2021-2023_TEP_Updated.pdf.

[592] Xcel Energy Minnesota. "Petition of Northern States Power Company for Approval of a Public Charging Network, an Electric School Bus Pilot, and Program Modifications." 2022. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={90B25F82-0000-C32B-B70E-1C25A3E2A491}&documentTitle=20228-188061-07.

[593] DTE Energy. Case No. U-21534. "Direct Testimony of Pina Bennett on Behalf of DTE Energy." 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CkNXIAA3.

[594] Ameren Illinois Company. "Beneficial Electrification Plan." 2022. Available at https://www.icc.illinois.gov/docket/P2022-0431/documents/325722/files/567031.pdf.

[595] American Council for an Energy-Efficient Economy. "Cost-Effectiveness Tests: Overview of State Approaches to Account for Health and Environmental Benefits of Energy Efficiency." December 2018. Available at https://www.aceee.org/sites/default/files/he-ce-tests-121318.pdf.

[596] U.S. Department of Transportation. "Benefits to Communities." Available at https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/community-benefits#:~:text=BEVs%20run%20with%20zero%20tailpipe,businesses%20and%20provide%20health%20benefits.

[597] U.S. Department of Transportation. "Community Benefits of Urban Mobility Electrification." Available at https://www.transportation.gov/urban-e-mobility-toolkit/e-mobility-benefits-and-challenges/community-benefits.

[598] U.S. Department of Energy. Alternative Fuels Data Center. "Emissions from Electric Vehicles". Available at https://afdc.energy.gov/vehicles/electric-emissions.

[599] Armstrong, S. "Killing the Roar: Electric Vehicles Can Calm Us Down." *The London Evening Standard.* July 2022. Available at https://www.standard.co.uk/optimist/plug-it-in/electric-vehicles-duncan-williams-noise-sound-b1010886.html.

[600] American Council for an Energy-Efficient Economy. "Cost-Effectiveness Tests: Overview of State Approaches to Account for Health and Environmental Benefits of Energy Efficiency." December 2018. Available at https://www.aceee.org/sites/default/files/he-ce-tests-121318.pdf.

criteria pollutant emissions, can be accurately quantified.[601] For example, ComEd,[602] Xcel Minnesota,[603] Xcel Colorado,[604] and Ameren[605] each used the Federal Social Cost of Carbon (SCC) developed by an interagency working group to calculate the social benefits of CO_2 reductions associated with transportation electrification.[606]

***Table 11:** Common TEP elements in selected TEPs*[607]

Essential TEP Components	Consumers Energy (MI)[608]	DTE Energy (MI)[609]	Xcel Energy (CO)[610]	ComEd[611] and Ameren[612] (IL)	Xcel Energy[613] (MN)
EV adoption forecast	✓	✓	✓	✓	✓
Chargers required to support EV adoption	✓	✓	✗	✓	✓
Charger utilization rate	✗	✓	✓	✓	✓
Expected load increases	✓	✓	✗	✗	✓
Installation costs	✓	✓	✓	✓	✓
Estimated power supply costs	✓	✓	✗	✓	✓
Societal benefits	✗	✗	✓	✓	✓

[601] Interagency Working Group on Social Cost of Greenhouse Gases. "Social Cost of Carbon, Methane, and Nitrous Oxide-Interim Estimates Under Executive Order 13990." February 2021. Available at https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

[602] ComEd. "Beneficial Electrification Plan." July 2022. Available at https://icc.illinois.gov/docket/P2022-0432/documents/325766/files/567114.pdf.

[603] Xcel Energy Minnesota. "Petition of Northern States Power Company for Approval of a Public Charging Network, an Electric School Bus Pilot, and Program Modifications." 2022. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={90B25F82-0000-C32B-B70E-1C25A3E2A491}&documentTitle=20228-188061-07.

[604] Colorado Xcel Energy. "Transportation Electrification Plan: 2021 – 2023." Available at https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/20A-0204E-_2021-2023_TEP_Updated.pdf.

[605] Ameren Illinois Company. "Beneficial Electrification Plan." 2022. Available at https://www.icc.illinois.gov/docket/P2022-0431/documents/325722/files/567031.pdf.

[606] Interagency Working Group on Social Cost of Greenhouse Gases. "Social Cost of Carbon, Methane, and Nitrous Oxide-Interim Estimates Under Executive Order 13990." February 2021. Available at https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

[607] The level of detail of the different TEP elements, as well as the way in which certain data points are calculated vary across and within states. A green check mark in the table above suggests that this element was at least discussed with an attempt to quantify the impact. A red "X" suggests that there was no mention of this element in the TEP or it was only discussed qualitatively.

[608] Consumers Energy. Case No. U-21538. "Consumers Energy Transportation Electrification Plan." June 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/document/download/0698y00000E0M6OAAV?operationContext=S1.

[609] DTE Energy. Case No. U-21538. "DTE Energy Company's Transportation Electrification Plan." January 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000BUT09AAH.

[610] Colorado Xcel Energy. "Transportation Electrification Plan: 2021 – 2023." Available at https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/20A-0204E-_2021-2023_TEP_Updated.pdf.

[611] ComEd. "Beneficial Electrification Plan." July 2022. Available at https://icc.illinois.gov/docket/P2022-0432/documents/325766/files/567114.pdf.

[612] Ameren Illinois Company. "Beneficial Electrification Plan." 2022. Available at https://www.icc.illinois.gov/docket/P2022-0431/documents/325722/files/567031.pdf.

[613] Xcel Energy Minnesota. "Petition of Northern States Power Company for Approval of a Public Charging Network, an Electric School Bus Pilot, and Program Modifications." 2022. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={90B25F82-0000-C32B-B70E-1C25A3E2A491}&documentTitle=20228-188061-07.

Quantification of Societal Benefits

The SCC has been included in Federal agencies' regulation planning since the issuance of Federal Executive Order 12866 in 1993.[614] Following a court ruling in 2008, it became required for Federal agencies to incorporate the SCC into their annual BCAs.[615] In response, an Interagency Working Group (IWG), was established in 2009 to ensure the accurate and consistent use of the SCC across Federal agencies' BCAs, and the first SCC estimates were reported in 2010.[616]

The SCC itself represents an estimate of the monetized net economic damages associated with an increase of one metric ton of CO_2 emissions over time.[617] GHG emissions reductions from transportation electrification can be quantified by comparing the difference between emissions from EV charging (i.e., based on emissions related to electricity generation) and emissions from ICE vehicles.[618, 619] Using the SCC, avoided emissions can then be converted to a cost. Regularly updated to reflect new findings, the federal SCC is recognized by federal agencies, state legislatures,[620, 621, 622] and public utility commissions [623, 624, 625, 626] alike as the best mechanism to quantify the social costs of CO_2 emissions and, therefore, the societal benefits of reduced emissions. For example, in 2018, the Minnesota Public Utilities Commission issued an order that finalized CO_2 and criteria pollutant cost estimates to be used by utilities in TEPs,[627] determining that the cost of CO_2 emissions is $33.52 per metric ton of carbon.[628] In accordance with this order,[629, 630] Xcel Minnesota converted avoided emissions to costs based on a weighted average of the types of vehicles (i.e., EVs versus ICE vehicles) in its service territory and the PUC's adopted cost of CO_2 emissions.[631]

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[614] The White House. Executive Order 12866. September 1993. Available at https://www.archives.gov/files/federal-register/executive-orders/pdf/12866.pdf.

[615] In 2008, the Center for Biological Diversity brought a case against the National Highway Traffic Safety Administration ("NHTSA") to the 9th Circuit Court over a proposed rule to establish the corporate average fuel economy ("CAFE") standards for light duty trucks, minivans, and some sport utility vehicles. The Court ruled that the NHTSA's Environment Assessment of these vehicle classes failed to adequately quantify the expected CO_2 emissions and assess the resulting environmental impact. See Center for Biological Diversity v. National Highway Traffic Safety Admin. 538 F.3d 1172, 1200 (9th Cir. 2008). 2008. Available at https://elaw.org/resource/ctr-biol-diversity-v-natl-hwy-transp-safety-bd-538-f3d-1172-9th-cir-2008.

[616] Interagency Working Group on Social Cost of Greenhouse Gases. "Social Cost of Carbon, Methane, and Nitrous Oxide-Interim Estimates Under Executive Order 13990." February 2021. Available at https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

[617] *Ibid.*

[618] California Public Utilities Commission. "Pacific Gas and Electric Company 2017 General Rate Case Phase II Updated and Amended Prepared Testimony." Exhibit (PG&E-9) Volume 1 Marginal Costs. December 2, 2016. Available at https://docs.cpuc.ca.gov/PublishedDocs/SupDoc/A1606013/319/170773573.pdf.

[619] Energy & Environmental Economics. "Technical Potential for Local Distributed Photovoltaics in California." 2012. Available at https://www.cpuc.ca.gov/-/media/cpuc-website/files/uploadedfiles/cpuc_website/content/utilities_and_industries/energy/reports_and_white_papers/ldpvpotentialreportmarch2012.pdf.

[620] New Jersey Legislature. NJ Rev Stat § 48:3-87.3. 2022. Available at https://njleg.state.nj.us/bill-search/2022/A5556/bill-text?f=A6000&n=5556_I1.

[621] Illinois General Assembly. Future Energy Jobs Bill (SB 2814): 220 ILCS 5/20-*135.* October 2018. Available at https://www.ilga.gov/legislation/99/SB/PDF/09900SB2814enr.pdf.

[622] Colorado Legislature. SB 19-236. 2019. Available at https://leg.colorado.gov/sites/default/files/2019a_236_signed.pdf.

[623] Public Utilities Commission of the State of California. "Decision 19-05-019: Decision Adopting Cost-Effectiveness Analysis Framework Policies for all Distributed Energy Resources." May 21, 2019. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M293/K833/293833387.PDF.

[624] Minnesota Public Utilities Commission Order. "E-999/CI-14-643: In the Matter of the Further Investigation into Environmental and Socioeconomic Costs Under Minnesota Statutes Section 216B.2422, Subdivision 3." January 3, 2018. Available at https://costofcarbon.org/files/MPUC_E-999_CI-14-643.pdf.

[625] Public Utilities Commission Order of Nevada. "Docket No. 17-07020: Investigation and rulemaking to implement Senate Bill 65 (2017)." August 15, 2018. Available at https://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2017-7/32153.pdf.

[626] New York Independent System Operator (NYISO). "Carbon Pricing Draft Recommendations: A Report Prepared for the Integrating Public Policy Task Force." August 2018. Available at https://www.nyiso.com/documents/20142/2179214/Carbon%20Pricing%20Draft%20Recommendations%2020180802.pdf/575a6d2b-ad09-d8f8-e566-39a0c04f9a43.

[627] Minnesota Public Utilities Commission Order. "E-999/CI-14-643: In the Matter of the Further Investigation into Environmental and Socioeconomic Costs Under Minnesota Statutes Section 216B.2422, Subdivision 3." January 3, 2018. Available at https://costofcarbon.org/files/MPUC_E-999_CI-14-643.pdf.

[628] *Ibid.*

[629] *Ibid.*

[630] The Minnesota Public Utility Commission Order Updating Environmental Cost Values adopts a range of environmental costs for CO_2 emissions defined by the IWG's SCC. This range allows for a value between the SCC with a 5.0% discount rate calculated through 2100, at the low end, and a 3.0% discount rate calculated through 2300, at the high end.

[631] Xcel Energy Minnesota. "Petition of Northern States Power Company for Approval of a Public Charging Network, an Electric School Bus Pilot, and Program Modifications." 2022. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={90B25F82-0000-C32B-B70E-1C25A3E2A491}&documentTitle=20228-188061-07.

In accordance with Illinois Public Act 102-662,[632] ComEd[633] and Ameren[634] monetized the cost of CO_2 emissions based on the federal SCC, assuming a societal impact of CO_2 emissions of $51 per metric ton. To assess the benefit of avoided emissions, Ameren, for example, calculated the difference between the expected increase in CO_2 emissions due to increased transportation electrification (1,033 pounds of CO_2 per kWh of increased load) and expected CO_2 emissions (absent transportation electrification) in pounds of carbon per MMBtu of gasoline and diesel fuel.[635] Emissions of criteria pollutants ($PM_{2.5}$ and NO_x), were calculated for different transportation electrification scenarios based on Argonne National Laboratory's Alternative Fuel Life-Cycle Environmental and Economic Transportation Tool.[636, 637] Ameren also applied an emissions factor to all of the emissions cost calculations attributed to LI areas to account for the increased impact that emissions have on EJ communities.[638]

Benefit-Cost Analysis

Fundamentally, a BCA should be used to show that the marginal revenue from EV load growth plus societal benefits more than pays for utility EV infrastructure investments, EV load optimization, and customer education programs. BCAs generally start with a scenario analysis to consider different EV deployment scenarios.[639] After this initial forecast, BCAs may include as benefits: estimated revenue from charging, expected state and federal incentives, any customer contributions to grid upgrades, estimates of the number of chargers required to support the anticipated EV adoption, charger utilization rates over time, expected increases in load, and societal benefits such as reduced greenhouse gas emissions or economic benefits. As costs, BCAs may include installation costs and estimated power supply costs. It is important, given that the BCA will likely determine the amount of revenue available for use on program elements such as rebates, make-ready infrastructure, or education, that these costs and benefits are appropriately and completely accounted for. The TEP common elements noted above (*Table 11*), including the evaluation of societal benefits, will often inform the calculations used to assess a proposed TEP's value via a BCA.

Recall that nine states, whether through legislation or Commission order, require IOUs to file TEPs as separately contested cases (*Table 10*). Of them, four – Colorado,[640] Illinois,[641] Minnesota,[642, 643] and Virginia[644] – explicitly require utility TEPs to seek to minimize costs and maximize benefits to all ratepayers and to be assessed for cost-benefit along a defined set of criteria. California requires the use of a "balancing test" that weighs the ratepayer benefits of utility-owned charging infrastructure against the competitive limitation from ownership.[645]

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[632] Illinois General Assembly. Public Act 102-0662 (SB 2408), Article 5: Energy Transition. February 2020. Available at https://www.ilga.gov/legislation/publicacts/102/PDF/102-0662.pdf.

[633] ComEd. "Beneficial Electrification Plan." July 2022. Available at https://icc.illinois.gov/docket/P2022-0432/documents/325766/files/567114.pdf.

[634] Illinois Commerce Commission. "Direct Testimony of Andrew Cottrell." Applied Energy Group, Inc. June 2022. Available at https://www.icc.illinois.gov/docket/P2022-0431/documents/325722/files/567037.pdf.

[635] *Ibid.*

[636] *Ibid.*

[637] U.S. Department of Energy. Argonne National Laboratory. "AFLEET Tool." Available at https://afleet.es.anl.gov/home/.

[638] Illinois Commerce Commission. "Direct Testimony of Andrew Cottrell." Applied Energy Group, Inc. June 2022. Available at https://www.icc.illinois.gov/docket/P2022-0431/documents/325722/files/567037.pdf.

[639] Xcel Energy Colorado. "Transportation Electrification Plan: 2021 – 2023." Available at https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/20A-0204E-_2021-2023_TEP_Updated.pdf.

[640] *Ibid.*

[641] Illinois General Assembly. Electric Vehicle Act: 20 ILCS 627. July 2022. Available at https://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3348&ChapterID=5.

[642] Minnesota Legislature. Electric Vehicle Charging Tariff: Minnesota Statute § 216B.1614. May 2014. Available at https://www.revisor.mn.gov/statutes/cite/216B.1614.

[643] Minnesota Public Utilities Commission Order. "E-999/CI-17-879: Order Making Finding and Requiring Filings: In the Matter of a Commission Inquiry into Electric Vehicle Charging and Infrastructure." February 1, 2019. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId=%7B10BBAA68-0000-C413-9799-DF3ED0978E75%7D&documentTitle=20192-149933-01.

[644] Commonwealth of Virginia Legislature. HB 2282. January 2021. Available at https://lis.virginia.gov/cgi-bin/legp604.exe?211+ful+HB2282+pdf.

[645] California Public Utilities Commission. "Decision 14-12-079/Rulemaking 13-11-007: Phase 1 Decision Establishing Policy to Expand the Utilities' Role in Development of Electric Vehicle Infrastructure." December 19, 2014. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M143/K682/143682372.PDF.

RECOMMENDATION

Establish consistent benefit-cost analysis methodologies to ensure accounting of TEP benefits from EV charging and the appropriate use of revenue to support deployment of EVSE and EV load management.

To fully capture the value of a utility TEP, it is important that utilities and PUCs evaluate not only programs' financial impact on ratepayers and the utility system, but also, on society as a whole. Therefore, just as important as the requirement for utilities to file TEPs as separately contested cases for approval by their respective Commissions, is for the Commission to set explicit expectations around TEP requirements and key BCA elements, which should include societal benefits and should be as objective and data-driven as possible.

Section 6.6: Vehicle-to-Grid

A necessary step towards fully realizing the beneficial applications of vehicle electrification is the enablement of Vehicle to Everything (V2X) technologies. While V2X is an encompassing term that can also include vehicles interfacing with non-charging infrastructure, for the purposes of this report, it is used to refer to the various bidirectional charging use cases. Common V2X applications are Vehicle to Home (V2H), Vehicle to Building (V2B), Vehicle to Vehicle (V2V), and Vehicle to Grid (V2G). Vehicle to Home/Building applications use a bidirectional charger to connect on the customer side of a utility meter on a building (i.e., behind-the-meter). These systems differ in that V2H systems operate while the grid is operational to perform peak shaving,[646] and thereby require an interconnection agreement with the utility whereas V2B systems act as backup systems and only operate when there is a grid outage and can allow for cost savings via peak shaving, especially for participating fleet operators. V2V involves connecting two vehicles to share charge between them. V2G is the process of using the vehicle as a fractional energy storage device, delivering electricity from the vehicle battery to the wider electrical grid.

V2X, and particularly V2G, has become an increasingly attractive possibility as vehicle manufacturers continue to release more bidirectionally capable vehicles.[647] While transportation electrification does create an increase in electricity demand, V2X (including managed charging and V2G opportunities) allows EVs to become a grid asset.

Benefits of V2X

Although V2X technologies can have a significant benefit on the electrical grid as a whole, for an EV owner to opt-in to provide power at times when it is needed to the grid through a V2G program, there must be individual benefit to the EV owner as well. Fortunately, research and test cases have shown that V2G systems can provide cost-savings and other benefits to all parties involved.

For the grid-operator, deployment and use of bidirectional capable EVs and EV chargers creates an immediately available demand response tool to balance grid conditions. As Michigan's electric grid becomes increasingly renewable and depends on more inverter-based resources such as wind and solar energy, it loses grid inertia, or the spinning reserve of energy from a traditional rotating generator. However, energy storage technologies present a solution in the form of fast frequency response (FFR, sometimes referred to as "synthetic inertia"). FFR refers to the ability of the battery to immediately dispatch

[646] Peak shaving is the process of charging a battery during times of low-electricity demand when electricity is cheaper and using the electricity in the battery to power the connected building during high-demand times of day when electricity is more expensive.

[647] General Motors. "GM Makes Vehicle-to-Home Bidirectional Charging Technology Available Across Portfolio of Upcoming Ultium-based EVs." Accessed June 2024. Available at https://news.gm.com/newsroom.detail.html/Pages/news/us/en/2023/aug/0808-v2h.html.

energy to the grid, reducing the amount of inertia required,[648] maintaining desired frequency and preserving efficiency. V2G enabled vehicles present grid operators with a potentially significant fleet of FFR devices to draw from without needing to invest ratepayer funding in other grid-scale options. For example, according to a study by EPRI, California's current frequency regulation market could be fully served by only around 100,000 V2G-enabled EVs, which is a fraction of the state's goal of 5 million EVs by 2030.[649] If California reaches this EV adoption goal and even half are V2G-enabled, V2G could provide $1 billion in annual benefits to the electric grid.[650] Given the higher costs currently associated with bidirectional chargers, however, utilities will need to effectively plan for bidirectional charger deployment. As with traditional Level 2 and DCFC charging, utilities can do so by conducting granular needs assessments and communicating results to prospective V2X customers via bidirectional hosting capacity maps.

RECOMMENDATION

Conduct a granular EVSE needs assessment that considers EV adoption growth, different types of chargers in various settings and market segments, equitable charger deployment, the implementation of innovative solutions, and the projected utility load growth required.

RECOMMENDATION

Require Michigan's utilities to provide up-to-date publicly available bidirectional hosting capacity maps to provide sufficient detail to allow right-sizing of installed EV chargers and installation of EV chargers in locations with sufficient distribution infrastructure.

For the vehicle owner, the benefit comes in the forms of outage protection, cost reduction through smart charging, and direct revenue from selling energy back to the grid. Replacing the need for a whole-home generator, many modern EVs can maintain a home's critical systems for several days in case of an outage. In a system that allows V2B only, energy cost reduction is still possible through smart charging and peak shaving. According to the same EPRI study, utilizing managed charging for TOU peak shaving creates an annual cost-reduction (leveled against battery degradation) to the customer of around $155 annually.[651] Enabling V2G with an appropriate tariff program (as described below) dramatically increases these cost savings for the vehicle owner by enabling a bill credit for electricity sent back to the grid. The same 2019 EPRI study found a levelized, relative benefit for V2G enabled ratepayers savings of $407 annually.[652] In some cases of high distribution capacity, these benefits rise as high as $1,018 annually.[653]

[648] Denholm, P., *et al.* National Renewable Energy Laboratory. "Inertia and the Power Grid: A Guide Without the Spin." May 2020. Available at https://www.nrel.gov/docs/fy20osti/73856.pdf.

[649] Chhaya, S. Electric Power Research Institute. "Open Standards-Based Vehicle-to-Grid: Value Assessment." 2019. Available at https://www.epri.com/research/products/000000003002014771.

[650] Electric Power Research Institute. "Vehicle-to-Grid: $1 Billion in Annual Grid Benefits?" *EPRI Journal.* 2019. Available at https://eprijournal.com/vehicle-to-grid-1-billion-in-annual-grid-benefits/.

[651] Chhaya, S. Electric Power Research Institute. "Open Standards-Based Vehicle-to-Grid: Value Assessment." 2019. Available at https://www.epri.com/research/products/000000003002014771.

[652] *Ibid.*

[653] *Ibid.*

The increasing prevalence of artificial intelligence (AI) in smart charging and grid operations continues to streamline the process for all parties involved. The largely digital inverter-based technologies such as EV chargers provide more real-time usage data than a human could realistically manage. Digital twin technologies, such as those used by Hitachi,[654] collect and organize the data and provide AI driven, real-time modeling for grid operators. Similar methods can be used to enable AI learning of general times of activity, TOU pricing, and other factors impacting EV charging, allowing automated systems to charge an EV battery with efficient means that mitigate battery degradation, maximize grid benefits, and maximize customer credits.

Interconnection

When considering interconnection issues related to V2X systems, it is important to consider separately those systems in which the vehicle is not exporting electricity to the grid and those systems in which the vehicle may be exporting power directly to the grid. In the first case, the vehicle is being charged and providing power only on-site (V2B as described above). In the case of these V2B systems, the vehicle is simply acting as a back-up power system when the electric grid is down (as in during a power outage), with no operation occurring in parallel with the electric grid. In this manner, a vehicle providing power to a home or business during a power outage operates like a more traditional diesel back-up generator. Although these are relatively new technologies, utilities and regulators are recognizing that such V2B systems, in a similar fashion to back-up generators, should not require interconnection applications. For example, in Michigan, Consumers Energy's draft interconnection procedures state that "An electric vehicle that operates solely as a load is not considered a [distributed energy resource] for purpose of this definition,"[655] meaning that an interconnection application is not necessary for such EVs.

The case of a vehicle that can export power to the grid is more complicated and requires an interconnection application with the utility. There are three basic inverter configurations to consider for these V2G operations:[656]

- *V2G-DC:* In this case, the EV charging station acts as a stationary smart inverter, converting from DC power provided by the vehicle battery to AC power usable to the grid while also providing other grid services as appropriate.
- *V2G-AC*: In this case, the EV acts as a mobile smart inverter, converting DC power from the battery to AC power and providing grid services as appropriate.
- *V2G-Split Inverter:* In this case, the conversion of DC to AC power occurs within the EV but the smart functions occur within the EV charging station.

According to IREC, to enable safe operation with the electric grid and ensure that communication protocols are effective, for the V2G-DC case, EV charging stations should be certified to meet the UL 1741 standard; for the V2G-AC case, EV charging stations should be certified to meet the UL 1741 SC standard and the vehicles should be certified to meet the SAE J3072 standard; and finally for the V2G-Split Inverter case, both the EV and charging station should be certified to meet the Institute of Electrical and Electronics Engineers 1547.1 standard.[657] In addition to these standards, communication protocols and the interoperability of those protocols is important to the effective integration of vehicles with utilities and the electric grid.[658]

In addition to the need to establish appropriate interconnection standards and communications protocols, especially in states with higher penetration of EVs, interconnection delays have become significant. V2G technologies being deployed in retail markets is a new process that puts interconnection rules to the test. Utilities have a large focus on the safety of the grid but can create barriers to customer adoption if timelines for bidirectional interconnection extend or interconnection rules are not technology-flexible or well established. According to a survey conducted by IREC, these include interconnection process

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[654] Ito, D. and H. Ishida. Hitachi. "Digital Twin Technology for Continuous Improvement at Manufacturing Sites." 2020. Available at https://www.hitachihyoron.com/rev/archive/2020/r2020_05/05a05/index.html#:~:text=The%2520Hitachi%2520digital%2520twin%2520solution%2520models%2520site%2520data%2520and%2520stores,materials%252C%2520and%2520methods%252Fprocedures.

[655] Consumers Energy. Case No. U-21480. "Consumer Energy Company's Application for Approval of Interconnection Procedures and Forms." March 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000Ce5QBAAZ.

[656] Mafazy, M. Interstate Renewable Energy Council. "Paving the Way: Vehicle-to-Grid (V2G) Standards for Electric Vehicles." January 2022. Available at https://irecusa.org/resources/paving-the-way-vehicle-to-grid-standards-for-electric-vehicles/.

[657] *Ibid.*

[658] *Ibid.*

delays (e.g., limited utility interconnection staff, lack of timelines for each step in the interconnection process, and long lead times for upgrade equipment like transformers), difficulties obtaining utility easements when needed, and slow permitting processes (often at the local level).[659] Several states including Colorado[660, 661] have recently undertaken legislative and regulatory efforts to clarify issues including timelines, cost-sharing, and requirements associated with these interconnection applications. For example, software (called a "Power Control System" or "Automated Load Management") can be used to dynamically manage loads, ensuring that export does not exceed a certain threshold. Interconnection standards and procedures that allow these software solutions can limit the need for expensive grid upgrades for V2X projects by ensuring that export is limited consistent with an interconnection agreement.[662] Similarly, Maryland Governor Wes Moore signed legislation on May 9, 2024 (MD-SB959) which requires the Maryland Public Services Commission to adopt regulations to establish expedited processes for interconnecting V2G systems to the distribution system by 2025.[663]

RECOMMENDATION

Establish an interconnection technical workgroup to collaboratively plan for future EV interconnection issues including those related to V2X.

Clarity around interconnection procedures and exploration of issues specific to V2X technologies may be best explored through a technical working group with the involvement of experts, engineers, utilities, MPSC Staff, and industry leaders. For example, the New York State Department of Public Service has established an Interconnection Policy Working Group, Interconnection Technical Working Group, and Interconnection Ombudsman.[664] These groups establish policies and technical procedures by voting and reaching consensus among stakeholders and then presenting these for final approval.[665] This process allows policy and technical requirements to adjust more efficiently to meet rapidly changing state and federal policies, new state legislation, new Commission rulings, and changes in technology.

Rate Design

In addition to enabling timely interconnection of V2X systems, it will be necessary to establish tariffs that incentivize customers to both install bidirectional chargers and then utilize their EVs in a manner that supports the grid, such as through distributed energy resource (DER) aggregation programs. It is important to recognize that to gain the expected grid benefits of V2X technologies (e.g., reduced need for peaking back-up generators, reduced need for grid upgrades, etc), the full value that these distributed resources bring to the grid must be quantified and an appropriate portion of that value must be provided to customers. This can be done through a tariff whereby a customer purchases power at the TOU retail rate to charge the vehicle and is credited at the TOU retail rate for providing power back to the grid. Crediting a customer at less than the retail rate would result in the customer avoiding any discharges back to the grid, thereby limiting net system benefits. For example, Maryland recently passed a law (MD-SB959) which establishes interconnection timelines and also directs the

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[659] Hernandez, M. Interstate Renewable Energy Council. "Paving the Way: Emerging Best Practices for Electric Vehicle Charger Interconnection." June 2022. Available at https://www.irecusa.org/resources/paving-the-way-emerging-best-practices-for-electric-vehicle-charger-interconnection/.

[660] Colorado Legislature. Senate Bill 218. 2024. Available at https://leg.colorado.gov/bills/sb24-218.

[661] Colorado Legislature. House Bill 1173. May 2024. Available at https://legiscan.com/CO/text/HB1173/2024.

[662] California Public Utilities Commission. "Rulemaking 21-06-017: Motion of Enphase Energy, Inc. to Amend Scoping Ruling and Schedule to Address Optional Flexible Connection Agreements and the Underwriters' Laboratory 3141 Standard for Power Control Systems in Investor-Owned Utilities' Energization Rules." May 6, 2024. Available at https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M531/K303/531303718.PDF.

[663] Maryland Legislature. Senate Bill 959. May 2024. Available at https://mgaleg.maryland.gov/2024RS/Chapters_noln/CH_475_sb0959t.pdf.

[664] New York State Department of Public Service. "Distributed Generation Information." Accessed June 2024. Available at https://dps.ny.gov/distributed-generation-information.

[665] Michigan Public Service Commission Order. "Docket No. U-21297: In the Matter of the Application of DTE Energy for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy, and Miscellaneous Accounting Authority." December 1, 2023. p. 341. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000At0VBAAZ.

Maryland Public Service Commission to require utilities to establish pilot programs or temporary tariffs to compensate for distribution support services on a pay-for-performance basis.[666]

V2X rates can also be designed to credit customers for demand response capabilities. Demand response programs incentivize electricity users to lower or shift their electricity consumption in response to a signal (either in real-time or in advance) from a utility. Because EV charging is a significant load, it can be a valuable demand response resource. For example, DTE Energy's Smart Charge program is a demand response program that has evolved since its original launch in 2019. During the second phase of the pilot in 2021, DTE Energy called for 31 demand response events over an eight-month period, saving 1.7 megawatt-hours (MWh) of electricity consumption.[667] According to DTE's 2024 TEP, the current phase of the program will be used to evaluate "the potential to pause or shift EV charging to reduce grid constraints during periods of high demand in the summer months."[668]

DER Aggregation

To support effective utilization of V2X resources, states can enable or require DER aggregation programs and the creation of virtual power plants (VPPs). DER aggregation is the process of effectively managing electricity provided by a number of individual behind-the-meter storage resources in a collective manner, creating VPPs. DER aggregation programs are already useful for load management and provision of electricity in times of peak demand, due to the continued proliferation of behind-the-meter storage and solar. This power pooling is often enabled by third-party aggregators who help recruit customers, facilitate DER dispatch, and provide software solutions for both customers and utilities. Aggregators are emerging as important allies in the execution of effective bidirectional pilots, especially as scale continues to grow, and it is important that these services are compensated alongside customers within pilot or program design. For example, the ConnectedSolutions program in Massachusetts aggregates behind-the-meter storage systems and thermostats to provide credits to customers who enable broad demand response capabilities in times of peak demand.[669] Legislation pending in Michigan would establish similar DER aggregation programs and VPPs (House Bill 4839[670] and Senate Bill 773[671]).

RECOMMENDATION

Establish policies necessary to enable and support deployment of V2X technologies at scale.

These programs may become more widespread with the implementation of FERC Order 2222. Issued in September 2020, FERC Order 2222 requires regional transmission organizations (like MISO) to remove barriers to participation in wholesale capacity, energy, and ancillary services markets but leaves interconnection processes for the behind-the-meter distribution-connected resources to state regulators.[672] MISO is currently in the process of establishing tariffs to comply with FERC Order 2222 and submitted its latest compliance filing in May 2024.[673] As EV adoption increases, V2G resources will provide even greater value to these DER aggregation programs, future-proofing the grid for continued load-growth.

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[666] Maryland Legislature. Senate Bill 959. May 2024. Available at https://mgaleg.maryland.gov/2024RS/Chapters_noln/CH_475_sb0959t.pdf.

[667] DTE Energy. Case No. U-21538. "DTE Energy Company's Transportation Electrification Plan." January 2024. p. 33. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000BUT09AAH.

[668] *Id.* p. 35.

[669] NationalGrid. "ConnectedSolutions." Accessed June 2024. Available at https://www.nationalgridus.com/MA-Home/Energy-Saving-Programs/ConnectedSolutions.

[670] Michigan Legislature. House Bill 4839. 2022. Available at https://www.legislature.mi.gov/Bills/Bill?ObjectName=2023-HB-4839.

[671] Michigan Legislature. Senate Bill 773. 2023. Available at https://www.legislature.mi.gov/Bills/Bill?ObjectName=2024-SB-0773.

[672] Federal Energy Regulatory Commission Order. "Order No. 2222: Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators." September 17, 2020. Available at https://www.ferc.gov/sites/default/files/2020-09/E-1_0.pdf.

[673] MISO. "DER Task Force." April 2024. Available at https://cdn.misoenergy.org/2024%20Order%202222%20Compliance%20Framework631391.pdf.

SECTION 7: POLICY RECOMMENDATIONS

As noted throughout this report, there are a number of policies and actions that the state of Michigan can take to ensure continued progress toward the 100,000 EV charger/2 million EV deployment goals. These include actions taken by the Executive Office of the Governor and state agencies ("Executive"), the Michigan Legislature ("Legislative"), and the MPSC ("Regulatory"). The recommendations are organized below in Sections 7.1, 7.2, and 7.3 into these three venues of change and listed in order of priority with the highest priority policies listed first in each section. Additional (lower priority) recommendations are listed in Section 7.4.

Section 7.1: Executive Recommendations

- **Require state agencies including the DTMB, EGLE, LARA, LEO, MDOT, MPSC, and others, to use the state's 100,000 charger/2 million EV deployment goal in their planning and evaluation criteria.**

  Note: This recommendation is complementary to a legislative recommendation listed in Section 7.3: Legislative Recommendations.

  — *Background:* The goal to reach 2 million EVs on the road is outlined in the MI Healthy Climate Plan. Additionally, the goal to deploy 100,000 EV chargers by 2030 to facilitate this vehicle transition was outlined in the MI Future Mobility Plan, developed in collaboration between the EOG, OFME, the Council of Future Mobility and Electrification, LEO, EGLE, the MEDC, the MPSC, the Department of Insurance and Financial Services, the Department of Treasury, and the Michigan State Police.[674] This cross-departmental plan was designed to help communities across the state to establish policies and programs to enable transportation electrification.

  — *Recommendations:* The metrics outlined in the MI Future Mobility Plan and MI Healthy Climate Plan were developed with significant cross-departmental and external stakeholder collaboration, and the EOG should require that all state departments, agencies, and offices align their planning around these goals to ensure that all government leaders are working towards a common objective. The Governor should also direct relevant state departments, agencies, and offices to establish an interdepartmental team that meets regularly and focuses on strategic coordination towards the goal of 100,000 EV chargers/2 million EVs.

- **Adopt language in the state energy conservation code to require all new homes and buildings be EV-R.**

  — *Background:* Currently, Michigan is in the final stages of updating its residential and commercial energy codes to the 2021 IECC model codes, which does not include language to support EV infrastructure requirements in new construction. Following the 2021 IECC update, Michigan will have the option of updating to the 2024 IECC model codes.

  — *Recommendations:* Following the current energy code update, the BCC should open the 2024 Michigan Energy Code to add EV infrastructure requirements to homes and buildings at the time of construction. These updates will save home and business owners money over the long term by reducing overall costs for installing EV chargers, driving charger accessibility and EV adoption.

- **Conduct a granular EVSE needs assessment that considers EV adoption growth, different types of chargers in various settings and market segments, equitable charger deployment, the implementation of innovative solutions, and the projected utility load growth required.**

  — *Background:* The state's 100,000 EV charger/2 million EVs goal addresses a broad range of charging settings, including but not limited to at-home charging, workplace charging, fleet charging, and public charging. The appropriate mix of chargers in different regions or localities to meet the needs of Michigan's diverse communities

[674] The Michigan Office of Future Mobility and Electrification. "MI Future Mobility Plan." November 2022. Available at https://www.michiganbusiness.org/4aecec/globalassets/documents/mobility/state-strategy-for-the-future-of-mobility-and-electrification-detailed-version.pdf.

has not yet been addressed, which makes planning for this goal (and confirmation that it's still the right infrastructure goal given EV and climate goals) in a granular manner challenging. This is particularly true for capacity constrained local units of government that lack the resources to effectively address these questions.

— *Recommendations:* To more effectively deploy the right EVSE technology to the optimal locations and at the right time, the state of Michigan should conduct a granular needs assessment that considers EV adoption in different communities and the types of EVSE to serve those settings. It is imperative that this study be collaborative across a wide variety of stakeholders including, but not limited to electric utilities, MDOT, MIO, OFME, EGLE, the Michigan State Police, and members of the EV and EVSE industries. This study should include:
  - An assessment EV adoption across market segments, prioritizing analysis of LI, DACs, and rural areas, and identifying opportunities to engage with these communities to facilitate EV adoption;
  - A recommendation regarding the appropriate mix of chargers to be deployed to meet the unique needs of Michigan's communities statewide;
  - A deployment timeline to indicate which charging needs should be prioritized in each community and when; and
  - A comprehensive evaluation of grid capacity across Michigan to determine a timeline of priority grid upgrades to enable local transportation electrification. Additionally, the study should identify opportunities for the implementation of innovative alternatives, such as VPPs, to alleviate grid constraints and minimize on-peak electricity consumption due to vehicle electrification.

  Once complete, this study can be used as a tool for local units of government as they plan for increased EV adoption. With the adoption of an EV-Readiness Program (details below), it can also be utilized to assist participating localities to more directly address their unique needs and effectively prioritize supportive actions.

- **Transition all state fleet vehicles to 100% EVs. Plans should be updated regularly to account for vehicle availability, price fluctuations, etc., and should be made publicly available.**

  — *Background:* The transportation sector is a major contributor to greenhouse gas emissions, and transitioning state fleet vehicles to electric is essential for reducing the environmental impact of government operations. In recognition of this, Governor Whitmer directed the state fleet to transition to zero-emission alternatives by introducing Executive Directive 2023-5.[675] The directive sets target dates to transition the state's light-duty and MHD vehicles to zero-emission alternatives. The directive also instructs DTMB, the state's fleet management agency, to prepare a Zero Emissions Plan. This plan should outline fleet replacement schedules, EVSE siting and build-out plans, program management plans and requirements, and operations and maintenance plans for new zero-emission vehicles and EVSE, as well as anticipated funding needs to complete the transition. This executive directive acknowledges the benefits of operating EVs in the state fleet, including lower operating costs, reduced emissions, and improved air quality.

  — *Recommendations:* To achieve the transition of all state fleet vehicles to 100% zero-emission alternatives, DTMB should establish intermediate milestones to track progress toward the target dates. DTMB should review the Zero Emissions Plan annually, including its assessment of the current fleet, updating funding estimates to complete the transition that accounts for changes in vehicle price and availability, and ensuring adequate charging infrastructure is in place to facilitate the transition of the state fleet. This annual review should also report on the status of the transition and the fleet's performance to maintain transparency and support for the initiative. Other state agencies should collaborate with DTMB and provide the necessary expertise to assist in the transition of the state fleet. The

[675] Executive Office of the Governor. Executive Directive 2023-5. December 2023. Available at https://www.michigan.gov/whitmer/news/state-orders-and-directives/2023/12/05/executive-directive-2023-5-conversion-of-state-fleet.

state should work collaboratively with other public and private entities, including municipalities and universities in Michigan, to assist in efforts to adopt zero-emission vehicles as instructed in the executive directive. As much as possible, findings should be made available to the public.

- **Support incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, MFH, and fleet charging applications.**

  Note: This recommendation is complementary to a legislative recommendation listed in *Section 7.3: Legislative Recommendations*.

  — *Background:* NEVI funding will be critical for expanding access to EV charging, especially DCFCs along highway corridors. However, there are still significant gaps to fill when it comes to EV charging access, and the NEVI program provides very little flexibility. In recent years, advocates and the EOG have recommended that the state pass funding in its state budget to provide additional rebates for EVSE. State funding would specifically target gaps in federal funding and utility programs, with incentives for rural charging, MFH properties, and fleet charging applications. For FY25, the Michigan Legislature included $30 million to fund the expansion of Michigan's EV charging infrastructure. Still, more funding is needed to ensure a truly comprehensive network of EV chargers in Michigan.

  — *Recommendations:* The EOG should include in the executive budget recommendations for ongoing state-level incentives for EVSE deployment in areas and communities where gaps in access to EV charging exist including DACs, rural communities, MFH, and fleet charging applications. State-level funding and incentives should complement existing state and federal funding programs and should encourage the research and development of innovative charging solutions to promote Michigan as a global leader in electric mobility technology. In addition to funding for EVSE deployment, the EOG should also advocate for funds in the state budget that include incentives for research, development and evaluation of new charging technologies and services.

- **Support incentives in the state budget to enable the adoption of new and used (owned and leased) light-, medium-, and heavy-duty EVs for public and private fleets, prioritizing those operating primarily in DACs.**

  Note: This recommendation is complementary to a legislative recommendation listed in *Section 7.3: Legislative Recommendations.*

  — *Background:* Fleet vehicles represent a critical segment in the transition to clean mobility, as these vehicles have an outsized impact on greenhouse gas emissions and air pollution from the transportation sector. The adoption of EVs for fleets, especially MHD EVs, face unique challenges, including higher upfront costs, limited availability of vehicle models, and the need for specialized charging infrastructure. Additionally, commercial users and communities often lack the financial resources and incentives to transition from ICE vehicles to electric alternatives.

  DACs have historically been disproportionately overburdened by transportation-related emissions.[676] Consequently, DACs should be the first to experience the benefits of transitioning fleet vehicles to EVs. To achieve this, targeted funding and incentives are essential to overcome these barriers and stimulate the market for MHD EVs.

  — *Recommendations:* To accelerate the adoption of electrified fleet vehicles, the EOG should include in the executive budget recommendations for new incentives that specifically address the unique challenges faced by this sector. These incentives should include rebates, tax credits, and/or grants that reduce the upfront costs of purchasing EVs and installing the necessary charging infrastructure. These incentives can support old and new construction, thereby helping developers and manufacturers think about how to incorporate charging infrastructure before depots are built. Additionally, funding should support pilot programs and demonstration projects to showcase the benefits and feasibility of EVs in various commercial and community settings, as well as niche charging infrastructure that support both the fixed and stop-and-go routes of fleet vehicles. The incentives should be

[676] U.S. Environmental Protection Agency. "Environmental Justice and Transportation." Available at https://www.epa.gov/mobile-source-pollution/environmental-justice-and-transportation#:~:text=Pollution%20from%20the%20transportation%20sector,disproportionate%20exposures%20to%20this%20pollution.

accessible to a diverse range of consumers, including small businesses, municipalities, and large corporations to ensure widespread market penetration. Incentives should prioritize the decarbonization of fleet vehicles that operate primarily in DACs. The EOG and legislators should collaborate with industry stakeholders, including vehicle manufacturers and fleet operators, to design effective incentive programs and ensure they meet the practical needs of end-users. Funding should be carefully designed to be additive to existing state and federal opportunities targeted at deploying low- and no-emission fleet vehicles.

- **Support incentives in the state budget to enable the adoption of new and used (owned and leased) passenger EVs, targeting incentives toward moderate and LI buyers.**

  Note: This recommendation is complementary to a legislative recommendation listed in *Section 7.3: Legislative Recommendations*.

  — *Background:* The adoption of light-duty electric vehicles by residential customers is a critical component of Michigan's strategy to reduce greenhouse gas emissions and promote sustainable transportation. However, the higher upfront costs of both new and used EVs compared to traditional ICE vehicles remain a significant barrier for many consumers. Addressing these cost barriers through targeted incentives is essential for accelerating EV adoption. States with additional incentives that are stackable with the federal tax credit for EVs have higher EV adoption rates.[677] In developing incentives, an equity-focused approach is particularly important to ensure that LI households, which may face greater financial constraints, can also benefit from the transition to cleaner vehicles.

  — *Recommendations:* The EOG should include in the executive budget recommendations for new incentives specifically designed to encourage the adoption of both new and used light-duty EVs for residential users. These incentives could include tax credits, rebates, and grants to lower the purchase or lease price for EVs, making them more affordable for a broader range of consumers. An equity lens should be applied to provide the greatest incentives to LI drivers, ensuring that the benefits of EV ownership are accessible to all. Additionally, the incentives could include step-ups for "super-commuters" who drive longer distances than an average driver, recognizing the additional environmental benefits of converting high-mileage vehicles to electric.

- **Streamline the permitting process by creating model EVSE permitting processes and educating local jurisdictions.**

  — *Background:* In the Planning and Zoning Guidance for Electric Vehicle Charging Deployment report, IREC and RMI indicate that most local zoning and permitting requirements are not written to accommodate EV charging infrastructure.[678] This, coupled with the capacity and resource constraints to manage applications at the local level, has led to lag times in project development.[679] Streamlining the permitting process can alleviate undue burdens on already capacity constrained AHJs and creates a more user-friendly experience that helps encourage increased project and economic development. The creation of model permitting processes can help further improve operational efficiencies for local AHJs and encourage consistency across the state's diverse localities. Additionally, if the same model permitting processes are adopted by AHJs across the state, contractors and EVSPs leading EVSE installation projects can eliminate project lags due to navigating different AHJs' zoning and permitting rules and inspection timelines, thus realizing further operational efficiencies. It is also possible to address model ordinances and permitting processes in statute, as in Colorado's 2024 HB 1173, which requires counties with a population of 20,000 or more, and municipalities with a population of 10,000 or more, to develop an EV charging permitting model code by 2026.[680]

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[677] Changus, J. Center for Sustainable Energy. "Why States Need EV Incentives Now." March 2023. Available at https://energycenter.org/thought-leadership/blog/why-states-need-electric-vehicle-incentives-now.

[678] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[679] Northeast States for Coordinated Air Use Management. "Improving Permitting and Zoning for EV Fast Charging Stations: Strategies for State and Local Action." December 2023. Available at https://www.nescaum.org/documents/ev-charger-permit-and-zoning-streamlining-fs-12-05-23.pdf.

[680] Colorado Legislature. House Bill 1173. May 2024. Available at https://legiscan.com/CO/text/HB1173/2024.

— *Recommendations:* The permitting process can be divided into two phases: the application phase and the review phase. As applicants begin to pull together the required materials for their application, it is important that they have a clear understanding of what is expected of them, the associated timeline of the review process, and any required fees to be paid. To enable an efficient deployment of the model permitting process, AHJs should:[681]

- Offer an online portal that clearly identifies the materials required, as well as the relevant processes, review timelines, and associated fees;
- Provide specific landing pages for different applicant segments (single-family, multi-family, workplace, public, commercial, etc.) with clear application instructions and review information for each; and
- Ensure that all application materials can be completed and submitted electronically.

Once materials are submitted, the application moves on to review. To avoid work redundancy and create efficiencies throughout the review processes, AHJs can:[682]

- Remove zoning board approval requirements for EVSE where possible;
- Allow for concurrent reviews of applications across multiple departments;
- Train application reviewers and inspectors on the EVSE-codes and ordinances; and
- Identify and train a point of contact to whom applicants can refer with questions throughout the application and review processes.

- **Develop model zoning ordinances that specifically address EVSE for various use cases and use model ordinances to support education of local jurisdictions.**

— *Background:* In Michigan, zoning ordinances that determine how different areas of land can be used are generally at the discretion of the AHJ. Some states, like California and New Jersey, have instead established statewide zoning ordinances or permitting processes for EVSE. In 2015, California enacted the Planning and Zoning Law (AB 1236) setting consistent statewide permitting standards to achieve efficient and cost-effective installations of EV charging infrastructure.[683] In 2021, New Jersey Governor Murphy signed Public Law 2021, Chapter 171 into law, which required that EVSE and make-ready parking space applications be considered a permitted accessory use and structure in all zoning districts.[684]

As of spring 2023, only 37 communities in Michigan have EV ordinances, ranging from allowing EV-only parking spaces to adopting a comprehensive Unified Development Code.[685] Because EVSE deployment is still relatively new, zoning ordinances, particularly in LI and rural communities without chargers, may not appropriately classify this equipment, if it is classified at all. In the absence of clear zoning requirements, planning departments and zoning boards are responsible for interpreting existing local ordinances to determine whether a project meets the necessary approval criteria. Depending on the use case, current zoning language, and departmental capacity, the approval process can be drawn out, leading to project delays and increased costs that threaten projects' financial viability.

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[681] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[682] *Ibid.*

[683] California Legislature. California Assembly Bill 1236. "Local Ordinances: Electric Vehicle Charging Stations." October 2015. Available at https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB1236.

[684] New Jersey Legislature. P.L. 2021, Chapter 171. Available at https://pub.njleg.gov/bills/2020/PL21/171_.HTM.

[685] Historically, zoning codes have been piecemeal, separating different sectors of the community into residential, commercial, office use, etc. This, however, can lead to a disjointed vision for the community and confusion among community members and AHJ administrators, stifling development. A Unified Development Code is a single document that brings together all development related regulations, which can allow for a more cohesive and holistic approach to community development.

— *Recommendations:* AHJs can take the following steps to better prepare for increased EV adoption:[686, 687, 688]
  - Depending on the EVSE site, amend local ordinances to classify EV charging stations as an accessory use. By definition, an accessory use classification refers to a use incidental to, and on the same lot as, a principal use.
  - When the charging stations are clearly the primary use, such as located at a gas/refueling station, allow for the classification as an approved use with streamlined permitting and zoning review.

  As with establishing model permitting processes, state departments, like EGLE, and regional organizations, like SEMCOG and MML, are well suited to develop model zoning ordinances and educate local municipalities on the importance of streamlined application and review processes.

- **Develop efficient, comprehensive, and centralized tools to help different user types and communities install EV chargers.**

  — *Background:* Residents, commercial operators, and fleet operators all have questions regarding EV adoption and choosing the right EVSE to meet their needs, yet each come with their own set of unique challenges to address and they may not always know where to go for information. The state of Michigan and local units of government have a critical role to play in supporting community stakeholders in their transition to vehicle electrification.

  — *Recommendations:* The state of Michigan, in partnership with the local government organizations and Regional Planning Organizations including, for example, MML, the Michigan Association of Counties, the Michigan Townships Association, and SEMCOG should develop tools that point interested parties to relevant EV and EVSE information including:

  (1) *A resource for local units of government:* This tool should aim to address common questions and challenges felt by local units of government. It could be an extension of the State of Michigan Community EV Toolkit[689] to provide:
    - If available, access to the state's assessment of local EV adoption and the necessary charging infrastructure to support it, as identified by the granular needs assessment (*see recommendation above*)
    - A checklist of key actions for local units of government to take, including, but not limited to:
      — Developing a partnership with the local electric utility to understand the grid capacity and the EVSE infrastructure requirements to meet and encourage the area's growing EV adoption;
      — Establishing zoning ordinances including reference to any developed model ordinances;
      — Developing streamlined permitting processes including reference to any model streamlined permitting processes;
      — Setting standard safety protocols for first responders and public safety personnel; and
      — Establishing resources for different user segments to address the feasibility of transitioning to EVs and choosing the right EVSE for their project needs.
    - Model zoning ordinance language developed by the state (*see recommendation above*). If this is not available, provide resources and examples from other localities to serve as guides and to illustrate the value of ordinances that specifically address EVs and EVSE.
    - Model permitting processes developed by the state (*see recommendation above*). If this is not available, provide resources and examples from other localities to serve as guides and to illustrate the value of streamlining permitting processes.
    - Available funding opportunities.

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[686] Gilliland, E. and R. Graff. Interstate Renewable Energy Council. "Planning and Zoning Guidance for Electric Vehicle Charging Deployment." August 2023. Available at https://sustainableenergyaction.org/wp-content/uploads/2023/08/IREC-SEAC-RMI_Resource_EV-Charger-Deployment_Aug2023.pdf.

[687] Northeast States for Coordinated Air Use Management. "Improving Permitting and Zoning for EV Fast Charging Stations: Strategies for State and Local Action." December 2023. Available at https://www.nescaum.org/documents/ev-charger-permit-and-zoning-streamlining-fs-12-05-23.pdf.

[688] Cooke, C. and B. Ross. Great Plains Institute. "Summary of Best Practices in Electric Vehicle Ordinances." July 2019. Available at https://www.betterenergy.org/wp-content/uploads/2019/06/GPI_EV_Ordinance_Summary_web.pdf.

[689] Southeast Michigan Community. "State of Michigan Community EV Toolkit." Accessed August 2024. Available at https://southeast-michigan-ev-resource-kit-and-planning-hub-semcog.hub.arcgis.com/.

- If available, information about an EV-Readiness Program (see recommendation below), and how local units of government can participate in it.

(2) *A resource for parties interested in EV adoption or EVSE installation:* This tool should aim to provide information to local residents, businesses, fleet operators, and business owners. Ideally, it should be organized to address each of these segments and their unique concerns and needs. It can also serve as a reference to local units of government looking to create similar resources specific to their own areas and regions. Depending on the user segment, this tool should:

- Provide a checklist to help in evaluating EV adoption and the user's unique charging needs. Depending on the user, this might include:
  - Connecting to the local utility to assess charging needs and identify an appropriate rate schedule;
  - Connecting to EVSPs that may be able to advise users in developing their projects; and
  - Links to local zoning ordinances and permitting processes.
- Point interested parties to relevant EV and EVSE information;
- Identify relevant incentive programs and stackability of funding;
- Direct users to relevant programs. For example, if a fleet operator is seeking to transition their business' fleet to EVs, they might be interested in a bulk buying program or learning more about scrappage requirements to be eligible for incentives; and
- Connect users to EVSPs that can help them establish a project strategy.

- **Establish an EV Readiness Program for community and local government leadership to foster understanding and ease the transition to EVs, prioritizing DAC participation.**

  — *Background:* A lack of clear information, confusion about opportunities, and misinformation can be common points of frustration for those navigating the purchase of an EV or installation of EVSE for the first time. This is particularly true for local units of government, which are already capacity constrained. Unfortunately, the inability to navigate funding opportunities and assess charging needs can lead to significant errors being made, project abandonment, and reduced economic engagement in a community. To address these issues, as described in *Section 3.2*, the Illinois MMC and Illinois ComEd developed the EV Readiness Program, an initiative designed to help Illinois local governments prepare to meet the growing demand for EVs and EV charging infrastructure and apply for state and federal funding opportunities.[690] With guidance, tools, and resources assembled by the MMC's EV Readiness Team, municipal leaders develop clear permitting for EV charging infrastructure, analyze zoning and parking codes to address barriers to EV infrastructure, engage their community, and participate in technical and safety training for staff. [691] The MMC's EV Readiness Advisory Committee, which is composed of a wide variety of stakeholders, also developed the publicly available EV Readiness Checklist.[692] The Checklist clearly outlines the actions that communities are required to take to earn points and achieve the Bronze, Silver, or Gold EV Readiness designation (more details can be found in *Appendix III*). Through efforts like the Illinois EV Readiness Program, localities can become better partners for community members seeking to enable transportation electrification.

  — *Recommendations:* Organizations like MML, which has deeply ingrained relationships with localities, could serve as critical leaders in developing a similar program, and expand upon the MI Funding Hub tool by providing education and technical support for localities seeking state and federal funding.[693] Localities in LI, DAC, and rural communities should be prioritized for participation in the program. All localities enrolled in the program should also be appropriately incentivized to participate. This program should engage with participants to:

[690] Metropolitan Mayors Caucus. "EV Readiness Program." 2022. Available at https://mayorscaucus.org/initiatives/environment/becoming-ev-ready/.

[691] *Ibid.*

[692] Metropolitan Mayors Caucus. "EV Readiness Checklist." 2023. Available at https://mayorscaucus.org/wp-content/uploads/2023/08/EV-Readiness-Checklist-3.0-for-web.xlsx.

[693] Michigan Municipal League. "MI Funding Hub." 2024. Available at https://mifundinghub.org/.

- Connect local units of government with their respective local utilities, allowing open communication about grid capacity and planning, choosing the right EVSE, and developing a cohesive strategy to enable EV adoption and access to charging. Localities can then also better direct residents, commercial operators, and fleet operators to their utility;
- Create comprehensive zoning and planning ordinances that include EVSE and ensure that it is effectively and efficiently evaluated in the permit review process. If available, the program should endeavor to use model zoning ordinances;
- Develop streamlined permitting processes to minimize project delays due to unnecessary administrative review and to alleviate pressure on AHJs. If available, the program should endeavor to use model permitting processes;
- Establish comprehensive safety protocols among first responders and public safety personnel;
- Include robust parking standards in residential and commercial spaces to allow safe and equitable access to EV charging;
- Develop materials to provide to residents, commercial operators, and fleet operators about vehicle electrification and charging needs; and
- Improve understanding of available incentives and how localities can help residents, commercial operators, and fleet operators educate the public on these opportunities.

- **Establish a robust talent pipeline for the clean mobility workforce to support operations and maintenance needs in the clean mobility sectors, including by supporting state funding for charger and EV maintenance programs at technical schools and community colleges, wrap-around services, soft skill training, and placement support.**

  — *Background:* As Michigan advances its clean mobility initiatives, there is an urgent need for a skilled workforce to support the operation and maintenance of EVs and charging infrastructure. The rapid growth of the EV market and the state's ambitious goals for charger deployment and EV adoption necessitate a workforce proficient in new technologies and maintenance practices. There is a perceived gap in the availability of trained technicians capable of servicing EVs and maintaining the associated charging infrastructure. Validating this gap requires improved access to employer data on current and future talent needs, including the specific skills and competencies needed for EV maintenance technicians across multiple employers. Addressing this gap is critical to ensuring the reliability and efficiency of EVSE.

  — *Recommendations:* To build a robust talent pipeline for the clean mobility workforce, Michigan should use state funding to support specialized training programs at technical schools and community colleges. These programs should focus on EV and charger maintenance, providing students with the necessary skills and certifications to meet industry demands. The programs should also establish partnerships with EV manufacturers, utility companies, labor unions, training providers, and other stakeholders to understand future hiring needs, develop curriculum, and provide hands-on training opportunities. Additionally, the state should provide or secure robust funding for wraparound services and barrier removal in order to increase access into these career pathways and attract a diverse pool of students. The state should work with employers, labor unions and other stakeholders to develop and promote industry-recognized credentials that are portable and transferrable, and which create real and meaningful pathways that feature skills-based advancement opportunities and family-sustaining wages, meaningful benefits, and high-quality workplace policies. Where possible, the state should encourage the adoption of successful existing programs, such as U.S. Department of Labor recognized pre-apprenticeship and apprenticeship programs. These training programs should be regularly reviewed and updated to ensure that they keep pace with technological advancements and evolving industry needs, ensuring a steady supply of qualified technicians ready to support Michigan's clean mobility future.

- **Establish low-cost financing opportunities for organizations, such as local units of government, political subdivisions, universities, and businesses looking to electrify fleets, paired with education to foster participation in DACs and rural areas.**

  — *Background:* The high upfront costs of EVs pose a significant barrier to adoption for municipalities and small businesses. These entities often lack the financial resources or credit access necessary to invest in new technologies like EVs, despite the long-term savings on O&M costs. Additionally, financial institutions may not have a complete understanding of the benefits and aspects that make EVs unique from ICE vehicles, which can impede the development of favorable auto loan products. Establishing low-cost financing options and educational programs for banks can address these barriers, facilitating the transition to cleaner transportation for smaller entities. Additionally, bulk-buying programs leverage collective purchasing power to secure better pricing and streamlined procurement processes for municipalities and small businesses.

  — *Recommendations:* Michigan should collaborate with its green bank, Michigan Saves, to design and implement low-cost financing options specifically designed for political subdivisions, public universities, and small businesses seeking to electrify their fleets. This initiative would provide accessible and affordable loans, reducing the financial burden of the initial investment in EVs and charging infrastructure. Furthermore, the state should implement educational programs for financial and insurance institutions, focusing on the unique financial profiles of EVs, including their lower maintenance costs and longer useful life. These programs will help financial institutions develop tailored auto loan products that better support EV purchases.

  Michigan should also implement and administer bulk-buying programs that enable smaller municipalities and businesses to collaborate in purchasing new electric fleet vehicles and chargers. Bulk purchasing would aggregate demand, allowing participants to benefit from volume discounts and reduced per-unit costs. The state should also provide administrative support to simplify the procurement process and assist participants in identifying and applying for relevant grants and incentives. Coordinating bulk purchases and offering logistical support will make it easier and more cost-effective for smaller entities to adopt EVs.

- **Align EVSE reliability standards among utility programs, state grant programs, and local funding programs to follow the NEVI guidance related to uptime.**

  Note: This recommendation is complementary to regulatory and legislative recommendations listed in *Section 7.2: Regulatory Recommendations* and *Section 7.3: Legislative Recommendations*.

  — *Background:* Maintaining operational charging stations is critical for EV driver satisfaction. A driver who is counting on a charging stop and finds that there is a long wait or the charging station is not functioning may not be able to get to the next charging location (or at least the next DCFC location), much less their destination in a timely manner. Word-of-mouth spread of such experiences could seriously harm efforts to enable and promote EV adoption in Michigan. Because of these issues, the NEVI Formula Program requires a greater than 97% uptime guarantee at the individual station level according to a standard formula which excludes instances like vandalism.[694]

  As these federal rules were being developed, the MPSC took actions to align reliability standards for EV charging stations supported by Michigan's IOU programs with the federal NEVI rules. Specifically, in November 2022, the Commission ordered DTE Energy to utilize a 97% uptime requirement aligned with the NEVI rules[695] and in January

[694] Federal Register. "National Electric Vehicle Infrastructure Standards and Requirements." March 2023. Available at https://www.federalregister.gov/documents/2023/02/28/2023-03500/national-electric-vehicle-infrastructure-standards-and-requirements.

[695] Michigan Public Service Commission Order. "Docket No. U-20836: In the Matter of the Application of DTE Energy Company for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy, and for Miscellaneous Accounting Authority." November 18, 2022. p. 331. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y0000058iIbAAI.

2023, the Commission similarly required participants receiving utility rebates from Consumers Energy to comply with a 97% uptime requirement and submit annual charger uptime reports using the standardized formula in the final NEVI rules.[696]

— *Recommendations:* Given that EV charging station site hosts often utilize multiple sources of funding (e.g., pairing NEVI grants with utility rebates), it is important to ensure that reliability requirements are standardized and consistent. Any future reliability requirements (e.g., for state funded programs) should require compliance with the most updated set of federal NEVI rules.

Section 7.2: Regulatory Recommendations

- **Encourage utilities to conduct EV load forecasting in a granular manner that allows for "no regrets" investments to mitigate grid constraints at anticipated congestion points.**

  — *Background:* In 2023, the Michigan Legislature passed several clean energy bills. Included among those new laws is Public Act 231, which modifies certain aspects of integrated resource planning. Specifically, the law requires the MPSC to study every four years not only the potential across Michigan for energy efficiency and demand response, but also to study "the potential for electrification of transportation, buildings, and industries consistent with economy-wide elimination of greenhouse gas emissions in this state, based on what is economically and technically feasible, as well as what is reasonably achievable."[697] The MPSC ordered the Commission Staff to work with outside consultants to begin these potential studies by September 30, 2024 and be completed by July 31, 2025. In addition to the long-term scenario planning enabled by TEPs, these potential studies should allow Michigan's utilities to conduct more granular EV load forecasting studies to enable targeted investments in the distribution system. This forecasting can inform the prudent purchasing of key distribution infrastructure components, such as transformers, to speed up new customer service requests. As described in *Section 7.3*, one mechanism to enable pre-approval of these "no regrets" investments would be to establish long-term TEP cases as separate contested cases with cost-recovery provided for approved plans.

  — *Recommendations:* Michigan's utilities should be encouraged to utilize forthcoming studies to conduct granular EV load forecasting to propose targeted investments in the distribution system. Cost-recovery for these investments could be provided through multi-year TEP cases (see recommendation in *Section 7.3*).

- **Support the expansion of utility rebates to enable investments in EVSE and software including for multifamily housing and rental units, workplace charging, and DCFC and Level 2 public charging, especially in DACs, rural, and other under-invested areas.**

  — *Background:* Utility rebate programs can enable homeowners, businesses, site hosts, and MFH property owners to afford the upfront costs of EV charging infrastructure. Although these rebates are an upfront cost to the utility (and thereby ratepayers), the increased revenue from charging enabled by these rebates provides long-term benefits and significant net revenue. For example, DTE Energy estimates that the investments proposed in its 2024 TEP (including the rebate programs) will start providing rate relief in 2033, ultimately resulting in at least $56 million in revenue to all ratepayers.[698] These utility rebates can also be tailored to support specific outcomes, such as build-out of public charging infrastructure in LI areas and DACs or at MFH properties.

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[696] Michigan Public Service Commission Order. "Docket No. U-21224: In the Matter of the Application of Consumers Energy Company for Authority to Increase its Rates for the Generation and Distribution of Electricity and for other Relief." January 19, 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000006KyFqAAK.

[697] Michigan Legislature. Public Act 231. November 2023. Available at https://www.legislature.mi.gov/documents/2023-2024/publicact/htm/2023-PA-0231.htm.

[698] DTE Energy. Case No. U-21534. "Direct Testimony of Pina Bennett on Behalf of DTE Energy." 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CkNXIAA3.

— *Recommendations:* Above all, it is critical that utility rebate programs which benefit all ratepayers are evaluated, supported, and approved by the MPSC. It is also important that utility rebates are tailored to ensure that the rebates together with other utility investments in EV charging infrastructure provides a net benefit to all ratepayers including non-EV customers. Further, such rebates or investments should be targeted to charging infrastructure that enables greater EV adoption (e.g., public charging infrastructure) and to equitably meet the needs of customers in segments where there are structural barriers to EV adoption (such as, but not limited to, apartments with shared parking areas or public charging in LI communities). Finally, different rebate levels should be offered for different types of EV chargers (scaled in terms of cost) and as the costs of EV charging infrastructure changes, so too should the individual rebate amounts.

- **Establish utility make-ready programs and policies to waive or enhance CIAC requirements.**

  — *Background:* When new EVSEs are interconnected to the grid, utilities need to plan and construct the infrastructure needed to serve that new load. Traditionally, in cases of new load, a customer pays a portion of the costs, called contribution in aid of construction (CIAC). It is important to remember that while new electric line extensions produce only revenue through sales at the newly served locations, public EV charging infrastructure enables EV adoption that will produce sales across the utility's territory. This is because public charging infrastructure is necessary to enable customer adoption of EVs and, subsequently, most customers who purchase an EV will do the majority of their charging at home. This means that the revenue generated by the installation of a single public DCFC is not only the revenue from that DCFC, but also all of the additional revenue from home charging that the DCFC enables. As such, utilities can support the build-out of public EV infrastructure by waiving CIAC policies for necessary upgrades without creating costs for other ratepayers.

  Public and fleet EV charging infrastructure can also be supported by "make-ready" programs. "Make-ready" infrastructure refers to the electrical equipment necessary to operate a charging station. This can include sub-panels, main-panels, conductors, wiring, transformers, and other equipment on both the customer and utility side of the meter. Make-ready programs offer utility investments in make-ready infrastructure to support deployment of charging stations. Through make-ready programs, utilities might, for instance, invest in rate-based distribution upgrades and branch line extensions, while leaving investments in chargers, charger ownership, operation and maintenance, marketing, customer service, and network operation to experienced EVSPs. Make-ready programs have become a common practice among utilities across the country with programs approved in states including

California,[699, 700] Connecticut,[701] Georgia,[702] Illinois,[703] Massachusetts,[704, 705, 706, 707] Minnesota,[708] Missouri,[709] New Mexico,[710] New York,[711] Pennsylvania,[712] Rhode Island,[713] and Virginia.[714] A make-ready program provides a reasonable balance between accelerating EV adoption, returning some net revenue from EV charging to those customers, and retaining substantial net revenue for the benefit of non-EV customers.

  - *Recommendations:* To support the build-out of EV charging infrastructure, leading to benefits for all ratepayers, Michigan's utilities should be encouraged to develop make-ready programs for the necessary grid infrastructure. In addition, utilities should waive CIAC policies for public EV charging infrastructure. It is clear that these investments will provide significant benefits for all ratepayers and, while creating a cost in the short-term, over the medium and long-term, will provide significant charging revenue that can provide downward pressure on utility rates.

- **Establish consistent benefit-cost analysis methodologies to ensure accounting of TEP benefits from EV charging and the appropriate use of revenue to support deployment of EVSE and EV load management.**

  - *Background:* As described in *Section 6.5*, many utility TEPs contain similar elements. It is important that these analyses start with a scenario analysis to consider different EV deployment scenarios (such as that conducted by XCel Energy in Colorado[715]). After this initial forecast, TEPs may include as benefits estimated revenue from charging, expected state and federal incentives, any customer contributions under CIAC policies, estimates of

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[699] California Public Utilities Commission Decision. "Docket No. A.14-04-014: Decision Regarding Underlying Vehicle Grid Integration Application and Motion to Adopt Settlement Agreement." February 4, 2016. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M158/K241/158241020.PDF.

[700] California Public Utilities Commission Decision. "Decision 22-11-040: Decision on Transportation Electrification Policy and Investment." November 21, 2022. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M499/K005/499005805.PDF.

[701] Connecticut Public Utilities Regulatory Authority Decision. "Docket No. 21-08-06: Annual Review of the Electric Vehicle Charging Program – Year 1." December 15, 2021. Available at https://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/372233877774b222852587ac005e47c2/$FILE/210806-121521.pdf.

[702] Georgia Public Service Commission Order. "Docket No. 44280: Order Adopting Settlement Agreement as Modified." December 30, 2022. Available at https://services.psc.ga.gov/api/v1/External/Public/Get/Document/DownloadFile/192550/74325.

[703] Illinois Commerce Commission Order. "Order, 22-0432/22-0442: Petition for Approval of Beneficial Electrification Plan under the Electric Vehicle Act, 20 ILCS 627/45 and New EV Charging Delivery Classes under the Public Utilities Act, Article IX and Investigation into Commonwealth Edison Company Beneficial Electrification Plan Filing pursuant to 20 ILCS 627/45." March 23, 2023. Available at https://www.icc.illinois.gov/docket/P2022-0442/documents/349478/files/610872.pdf.

[704] Massachusetts Department of Public Utilities Order. "Docket 17-05: Order Establishing Eversource's Revenue Requirement." November 30, 2017. Available at https://www.mass.gov/files/documents/2018/01/26/17-05_Final_Order_Revenue_Requirement_11-30-17.pdf.

[705] Massachusetts Department of Public Utilities Order. "Docket 21-90: Order on Petition of NSTAR Electric Company d/b/a Eversource Energy for approval of its Phase II Electric Vehicle Infrastructure Program and Electric Vehicle Demand Charge Alternative Proposal." December 30, 2022. Available at https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/16827694.

[706] Massachusetts Department of Public Utilities. "Docket 17-13: Petition of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, for Approval of its Electric Vehicle Market Development Program, and of its Electric Vehicle Market Development Program Provision, pursuant to G.L. c. 164, §§ 76, 94, and Acts of 2016, c. 448." September 10, 2018. Available at https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/9800474.

[707] Massachusetts Department of Public Utilities Order. "Docket 21-91: Order on Petition of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, for approval of its Phase III Electric Vehicle Market Development Program and Electric Vehicle Demand Charge Alternative Proposal." December 30, 2022. Available at https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/16827695.

[708] Minnesota Public Utilities Commission Order. "Docket 18-643: Order Approving Pilots with Modifications, Authorizing Deferred Accounting, and Setting reporting Requirements." July 17, 2019. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId=%7BD017016C-0000-CD10-8791-F2FF6B5C1546%7D&documentTitle=20197-154444-01.

[709] Missouri Public Service Commission Order. "Docket 2018-0132: Order Approving Second Stipulation and Agreement." February 6, 2019. Available at https://www.efis.psc.mo.gov/Document/Display/760285.

[710] New Mexico Public Regulation Commission Order. "Docket No. 20-00237-UT: Final Order Adopting Recommended Decision, I/M/O Public Service Company of New Mexico's Application for Approval of its 2022-2023 Transportation Electrification Program." November 2021.

[711] New York Public Service Commission Order. "Case 18-E- 0138: Order Establishing Electric Vehicle Infrastructure Make-Ready Program and Other Programs." July 16, 2020. Available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={6238DD07-3974-4C4E-9201-3E339E311916}.

[712] Pennsylvania Public Utilities Commission Order. "Docket No. R-2018-3000124: Opinion and Order." December 20, 2018. Available at https://www.puc.pa.gov/pcdocs/1599276.docx.

[713] Rhode Island Public Utilities Commission. "Docket No. 4780: Re the Narragansett Electric Company d/b/a National Grid Proposed Power Sector Transformation Vision and Implementation Plan." August 16, 2018. Available at https://ripuc.ri.gov/sites/g/files/xkgbur841/files/eventsactions/docket/4770-4780-NGrid-Compliance-Filing-Book-1---August-16,-2018.pdf.

[714] Virginia Division of Public Utility Regulation. "Case No. PUR-2019-00154: Final Order. Petition of Virginia Electric and Power Company for approval of a plan for electric distribution grid transformation projects pursuant to §56-585.1 A 6 of the Code of Virginia, and for approval of an addition to the terms and conditions applicable to electric service." March 26, 2020. Available at https://www.scc.virginia.gov/docketsearch/DOCS/4m1j01!.PDF.

[715] Colorado Energy Office, Department of Transportation, Department of Public Health and Environment, and the Regional Air Quality Council. "Colorado Electric Vehicle Plan." January 2018. Available at https://drive.google.com/file/d/1VLxC2m52IaDiRAfeuly5WKBsgAwfoUMJ/view.

the number of chargers required to support the anticipated EV adoption, charger utilization rates (over time), expected increases in load, and societal benefits such as reduced carbon emissions or air quality improvements. As costs, TEPs may include installation costs and estimated power supply costs. It is important, given that the TEP will likely determine the amount of revenue available for use on program elements such as rebates, make-ready infrastructure, or education, that these costs and benefits are appropriately and completely accounted for.

— *Recommendations:* The MPSC should set explicit expectations around key TEP elements that should be as objective and data driven as possible. Ideally, these should include estimates over time of at least the following elements:
  - Short- and long-term scenario forecasts for EV adoption;
  - Estimate of the number of chargers by charger type expected to be needed to support the projected EV adoption;
  - Expected utilization rate by charger type and customer segments;
  - Expected incremental load increases with at least on-peak/off-peak differentiation by charger type and customer segment;
  - Estimated incremental revenue from EV charging load;
  - Societal benefits including, but not limited to, reduced greenhouse gas emissions, reduced noise pollution, improved physical and mental health;
  - Estimated installation costs by charger type and customer segment on per-charger basis, including any expected incremental cost savings/increases due to multiple chargers at one location;
  - Estimated utility make-ready costs; and
  - Estimated incremental distribution and power supply costs to accommodate EV charging load.

- **Establish policies necessary to enable and support deployment of vehicle-to-X (V2X) technologies at scale.**

  — *Background:* As discussed in *Section 6.6*, while V2X holds great potential to benefit customers, the grid, and communities, V2X technologies and deployment are still relatively nascent. It is important that we start to establish policies to enable exploration of V2X technologies as well as interconnection and tariff policies to encourage customer adoption of V2X technologies. In early 2023, the MPSC established a process to allow utilities to offer pilots on an expedited basis outside of general rate cases if they are sufficiently supported by stakeholders and beneficial to address climate change.[716] Although no pilots have yet been proposed through this process, both Consumers Energy and DTE Energy are developing work plans and could file pilots, including those focused on V2X technologies, in the coming months.

  In addition, it is important to establish interconnection standards to enable V2X technologies and to address issues in advance of energization timeline issues experienced in other states by streamlining interconnection processes for V2X systems and enabling dynamic load management technologies to limit export. Tariffs should also be established to appropriately, fairly, and transparently credit customers for the benefits provided by V2X systems and avoid demand charges. This valuation process may occur through statutory requirements to establish DER aggregation programs with accurate valuation such as that required by legislation currently pending before the Michigan Legislature (House Bill 4839[717] and Senate Bill 773[718]).

  — *Recommendations:* Policies should be established in Michigan to support deployment of V2X technologies including: (1) the development of appropriate interconnection standards to support V2G connectivity; (2) the development of utility tariffs to support V2G connectivity; (3) the establishment of long-term rate design to enable bi-directional DCFC station deployment, which could include demand charge relief; and (4) passage of legislation to enable DER aggregation and microgrids. Michigan's utilities should also work with stakeholders, regulators, and the state to outline goals, opportunities, and plans related to V2G technologies.

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[716] Michigan Public Service Commission Order. "Docket No. U-20898: In the Matter to Commence a Collaborative to Consider Issues Related to Implementation of Effective New Technologies and Business Models." February 23, 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000006tgUFAAY.

[717] Michigan Legislature. House Bill 4839. 2022. Available at https://www.legislature.mi.gov/Bills/Bill?ObjectName=2023-HB-4839.

[718] Michigan Legislature. Senate Bill 773. 2023. Available at https://www.legislature.mi.gov/Bills/Bill?ObjectName=2024-SB-0773.

- **Support alternative and complementary approaches to time-of-use rate design, such as active managed charging, to optimize grid load and maximize customer benefits while minimizing new capital expenditures.**

  — *Background:* Simple TOU rates, while effective at shifting residential charging to overnight hours, may ultimately need to be modified, scrapped, or used in conjunction with actively managed charging options. This is because as EV penetration increases, using TOU rates to shape load may become inadequate because the surge in demand at the beginning of the low-price period will become untenable. In addition, as solar and wind energy become increasingly important in power supply, grid stress will be associated with periods of lower renewable generation relative to load. These periods will not be consistent as to season or time of day. At some point in the future, it will therefore be necessary to move from TOU rates toward more sophisticated load-shaping strategies for EVs, which are likely to include some level of communication with charging infrastructure or vehicles.

  — *Recommendations:* Michigan's utilities should be encouraged to conduct pilots to test alternatives to TOU rate designs such as staggered managed charging. This can be done both through rate cases and through expedited pilots with stakeholder support.

- **Support policies to waive demand charges for DCFC until utilization rates increase sufficiently.**

  — *Background:* Although most EV charging happens at residential homes, public DCFC infrastructure including at MFH is essential to enabling long-distance travel and, according to studies,[719] is critical for reducing range anxiety for new customers. However, because DCFCs are more expensive to install and utilization rates are currently low, it can be difficult to establish a workable business case for these investments. Demand charges based on peak usage can add to costs and further erode the business case for DCFC, especially where utilization is currently low.[720, 721, 722] To address these issues, utilities across the country including in Michigan have proposed temporary reductions or elimination of demand charges, maximum demand charge fees (capped in terms of energy consumption), and subscription plans for DCFC services.[723] For example, through June 2026, DTE Energy will allow DCFC to take service under a commercial rate that does not have a demand charge by waiving the existing 1,000 kW demand limit for this rate schedule only for DCFC. This option was recently extended until June 2026 with DCFC energized after June 2024 permitted to remain on that rate schedule for two years.[724]

  — *Recommendations:* Tariffs for DCFC should be designed to minimize demand charges. This can be done by allowing DCFC to utilize tariffs without demand charges or by waiving demand charges for DCFC. These changes can be phased out after utilization rates reach specific higher thresholds.

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[719] Li, S., *et al.* "The Market for Electric Vehicles: Indirect Network Effects and Policy Design." *Journal for the Association of Environmental and Resource Economists.* Volume 4, Number 1. March 2017. Available at https://www.journals.uchicago.edu/doi/full/10.1086/689702.

[720] Great Plains Institute and Midcontinent Transportation Electrification Collaborative. "Analytical White Paper: Overcoming Barriers to Expanding Fast Charging Infrastructure in the Midcontinent Region." July 2019. Available at https://scripts.betterenergy.org/reports/GPI_DCFC_Analysis_July_2019.pdf.

[721] Fitzgerald, G. and C. Nelder. RMI. "EVGo Fleet and Tariff Analysis – Phase 1: California." April 2017. Available at https://rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf.

[722] National Association of State Energy Officials, Western Interstate Energy Board, and Utah Clean Cities. "Demand Charges & EV Fast Charging: An Intermountain West Assessment." October 2021. Available at https://www.naseo.org/data/sites/1/documents/publications/Demand%20Charges%20and%20EV%20Charging%20-%20Final.pdf.

[723] *Ibid.*

[724] Michigan Public Service Commission Order. "Docket No. U-21297: In the Matter of the Application of DTE Electric for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy, and Miscellaneous Accounting Authority." December 1, 2023. p. 341. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000At0VBAAZ.

- **Require Michigan's utilities to provide up-to-date publicly available bidirectional hosting capacity maps to provide sufficient detail to allow right-sizing of installed EV chargers and installation of EV chargers in locations with sufficient distribution infrastructure.**

  — *Background:* Hosting capacity is an "estimate of the maximum amount of DERs that can be connected to the grid without compromising the power quality and reliability and requiring any controls or infrastructure upgrades."[725] Load carrying capacity generally looks at the amount of load (e.g., EV chargers) that can be connected to the grid, similarly without causing compromised power quality or reliability. Michigan's utilities began providing basic hosting capacity maps recently and, in some cases, provide basic load carrying capacity maps. For example, Consumers Energy's[726] and DTE Energy's[727] currently available hosting capacity maps show "go/no go" polygons for the interconnection of generators <2 MW in capacity. DTE Energy does provide an EV Hosting Capacity Map which shows portions of DTE service territory with the current electrical capacity to support the installation of new DCFC of varying power levels.[728] However, because these maps are generally not very detailed and not updated frequently, inquiries for EV charging installations are generally addressed as the projects are proposed. However, without publicly available information, it can be difficult for site hosts who want to install DCFC or EV charging infrastructure companies to determine the best sites for these projects to avoid costly grid upgrades. In a June 2023 report, the MPSC recommended that Michigan's utilities should develop bi-directional hosting capacity maps to simultaneously show both the maximum amounts of generators that can be interconnected and the maximum load that can be interconnected.[729] According to the report, bi-directional hosting capacity can better allow for dynamic hosting capacity to integrate the time-varying nature of renewable energy generation and EV charging behaviors. Similar capabilities have been successfully implemented in other jurisdictions and provide valuable information for the siting and sizing of charging infrastructure.[730]

  — *Recommendations:* Michigan's utilities should move toward the provision of bi-directional hosting capacity maps. Given that this will take time, in the short term, Michigan's utilities should provide both granular hosting capacity and load carrying capacity maps. In addition to the need to provide publicly available load carrying capacity data to ensure that EV charging stations can be installed in an economical manner, it is also critical that this information is current. As such, it is important to ensure that utilities are supported to provide regular (i.e., monthly or quarterly) or automatic updates to hosting capacity and load carrying capacity maps instead of providing annual updates.

- **Establish an interconnection technical workgroup to collaboratively plan for future EV interconnection issues including those related to V2X.**

  — *Background:* Starting in late 2018, the MPSC began a process to update the state's interconnection standards to comply with FERC Orders and changes in the DER landscape since the previous update was completed in 2009.[731] In April 2023, the new Interconnection and Distributed Generation rules became effective.[732] Although this revision to the state's interconnection standards was extensive, because EV deployment has only increased in recent years

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[725] Michigan Public Service Commission. "Docket No. U-21251: Grid Integration Study Report." June 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000008L2jEAAS.

[726] Consumers Energy. "Hosting Capacity." Accessed June 2024. Available at https://cms.maps.arcgis.com/apps/instant/lookup/index.html?appid=b90ff63b338043b7bcae43dd685a419d.

[727] DTE Energy. "Hosting Capacity." Accessed June 2024. Available at https://dte.maps.arcgis.com/apps/webappviewer/index.html?id=64e9f4e0f82c42e7b7ed847273ec2764.

[728] DTE Energy. "DTE EV Hosting Capacity Map." Available at https://dte.maps.arcgis.com/apps/webappviewer/index.html?id=15bba98a360740929f0d5c6bec8fdd6c.

[729] Michigan Public Service Commission. "Docket No. U-21251: Grid Integration Study Report." June 2023. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000008L2jEAAS.

[730] National Grid. "Massachusetts System Data Portal." Accessed June 2024. Available at https://www.nationalgridus.com/Business-Partners/MA-System-Portal.

[731] Michigan Public Service Commission. "Interconnection Rules Development." Accessed June 2024. Available at https://www.michigan.gov/mpsc/commission/workgroups/mi-power-grid/interconnection-standards-and-worker-safety/interconnection-rules-development.

[732] Department of Licensing and Regulatory Affairs. Michigan Public Service Commission. "Interconnection and Distributed Generation Standards." April 2023. Available at https://www.michigan.gov/mpsc/-/media/Project/Websites/mpsc/workgroups/interconnection-std/MIXDG-Updated-Rules.pdf?rev=e0aba826a2414cea810b29a27ae9c814&hash=FCD2FD051E0ABE7C4E8A504C4F6BB31E.

in Michigan and V2X technologies are still new, the revised standards may not effectively enable interconnection of bi-directional EV chargers. Separately, there are other recent technological advances and new standards/protocols that may not be referenced or contemplated by the existing standards. These issues and other issues related to interconnection may be best explored through a technical working group with the involvement of experts, engineers, utilities, Commission Staff, and industry leaders. For example, the New York State Department of Public Service has established an Interconnection Policy Working Group, Interconnection Technical Working Group, and Interconnection Ombudsman.[733]

- *Recommendations:* The MPSC should establish a technical working group to discuss and come to agreement, where possible, on technical interconnection issues, including those related to EVs and V2X technologies.

- **Align EVSE reliability standards among utility programs, state grant programs, and local funding programs to follow the NEVI guidance related to uptime.**

  Note: This recommendation is complementary to executive and legislative recommendations. For details, see *Section 7.1: Executive Recommendations*.

Section 7.3: Legislative Recommendations

- **Pass new legislation to establish and implement a CFS.**

  - *Background:* Building out a sufficient public EV charging is going to be costly, and establishing a CFS program in Michigan is one of the most promising opportunities to support transportation electrification. A CFS sets targets for reducing the CI of transportation fuels and establishes a credit trading market for fuel providers. Providers of low-carbon transportation fuels, like EVSPs, can use the revenue from their credits to invest in more EV charging stations.[734] Analyses on Michigan's proposed CFS show average annual benefit for electricity producers and charging providers to be over $500 million.[735] In 2023, Michigan introduced Senate Bill 275 to establish this policy.

  - *Recommendations:* To maximize the benefit of the CFS policy, Michigan should consider the following:[736]
    - Ensure issues of equity are addressed upfront by investing a percentage of credits back into LI communities and DACs. Requiring investment of some credits into programs such as ESBs and transit buses, DCFC charging infrastructure deployment, and rebates for used EVs encourages EV adoption and allows LI community members to further benefit from the CFS.
    - CFS programs should include electricity as a fuel eligible for credit generation. With a lower CI than other fuel options, electricity providers, charging providers, automakers, fleets and others can generate credits that can be monetized and reinvested in EVSE and the EV transition, benefitting all ratepayers and community members.
    - Engage a broad coalition of stakeholders to achieve shared benefits across the transportation electrification value chain.

[733] New York State Department of Public Service. "Distributed Generation Information." Accessed June 2024. Available at https://dps.ny.gov/distributed-generation-information.

[734] Electrification Coalition. "Clean Fuel Standard." Accessed June 2024. Available at https://electrificationcoalition.org/resource/clean-fuel-standards/.

[735] Michigan Clean Fuel Standard Coalition. "Michigan Clean Fuel Standard's $12 Billion Economic Boost." Accessed June 2024. Available at https://23168950.fs1.hubspotusercontent-na1.net/hubfs/23168950/MICFS_Fact%20Sheet_Economic_2024-0311.pdf.

[736] Tesfaye, M., *et al.* Bipartisan Policy Center. "Designing a Bipartisan Federal Clean Fuel Standard: Roundtable Takeaways." January 2024. Available at https://bipartisanpolicy.org/download/?file=/wp-content/uploads/2024/01/BPC_Energy-Low-Carbon-Fuel_Roundtable_Takeaways_Jan_2024.pdf.

- **Pass new legislation to create the statutory authority for utilities to make comprehensive investments in transportation electrification at scale and require that utility TEPs are filed as contested cases with approved plans providing expected cost recovery over the proposed planning horizon.**

  — *Background:* DTE Energy filed a TEP voluntarily in late 2023[737] and, subsequently, the MPSC issued orders requiring Commission Staff to develop guidelines for utility TEPs[738] and requiring Consumers Energy to file a TEP by July 1, 2024.[739] These voluntary and Commission-led planning processes can and should support broader, more cohesive, long-term plans to support the deployment of EV charging infrastructure. However, because these TEPs are not separate contested cases, the investments proposed in the plans must be evaluated and approved in general rate cases, which can be filed by Michigan's IOUs as often as once every 12 months. This creates a significant burden on both the utilities and stakeholders who are often challenged to participate meaningfully and constructively in large, complicated general rate cases. In addition, because general rate cases provide relatively short-term approvals for ratepayer-funded investments, this process does not allow for pre-planning or investments to support future build-out of EV charging infrastructure. This can lead, as discussed previously, to backlogs of critical components such as transformers. Finally, it can lead to disallowance of key upgrades when investments in transportation electrification are not considered "critical infrastructure."

  — *Recommendations:* The legislature should require the IOUs to file multi-year TEPs as separate contested cases with pre-approval provided for cost recovery for approved investments over the time period of the proposed course of action. This process would allow for appropriate scenario analysis, long-term planning, and benefit-cost analyses, and integration with utility distribution plans. It would also support utilities in the procurement of necessary infrastructure in advance of interconnection requests for EVSE. Finally, it would allow interested stakeholders to support proposed utility investments in a separate adjudicated docket.

- **Adopt incentives in the state budget for Level 2 and DCFC, especially for EVSE in DACs and rural areas, MFH, and fleet charging applications.**

  Note: This recommendation is complementary to an executive recommendation listed in *Section 7.1: Executive Recommendations*.

  — *Background:* For details, refer to *Section 7.1: Executive Recommendations*.

  — *Recommendations:* In the state budget, the legislature should include ongoing state-level incentives for EVSE deployment to provide funding support to areas and communities where a gap in access to EV charging is already emerging including DACs, rural communities, MFH properties, and fleet charging applications. State-level funding and incentives should complement existing state and federal funding programs and should encourage the research and development of innovative charging solutions to promote Michigan as a global leader in electric mobility technology.

[737] DTE Energy. Case No. U-21538. "DTE Energy Company's Transportation Electrification Plan." January 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000BUT09AAH.

[738] Michigan Public Service Commission. "Docket No. U-21492: In the Matter to Open a Docket that Will be Used to Collaboratively Consider and Address Issues and Concerns Related to Use and Deployment of Electric Vehicles in a Commission-sponsored Technical Conference." March 15, 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CW7TZAA1.

[739] Michigan Public Service Commission Order. "Docket No. U-21389: In the Matter of the Application of Consumers Energy for Authority to Increase its Rates for the Generation and Distribution of Electricity and for other Relief." March 1, 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CGiDUAA1.

- **Pass new legislation updating Michigan's construction code statute to require the BCC to update its energy conservation code every 3 years and remove the 7-year cost-effective requirement for new codes.**

  — *Background:* Michigan's building code adoption process is authorized under the Construction Code Act.[740] Under this statute, LARA has the option to update the energy code every three years to match the model code schedule, or to skip a code cycle and update the energy code every six years. There are several barriers in Michigan to the adoption of energy codes that would include the infrastructure and electrical requirements to support installation of EV chargers in the minimum requirements for new construction. Specifically, the statute only allows LARA to require new provisions that will be cost-effective (i.e., payback) within seven years. Because EV charging infrastructure, by definition, does not save energy – and in fact, it increases a homeowner or business owner's energy demand – it is difficult to prove that these investments will meet this cost-effectiveness test. In addition, LARA is currently allowed to skip a code cycle and only update the energy code every six years. Because EV technologies are changing so quickly, this can mean that opportunities to support EV infrastructure build-out may be missed.

  — *Recommendations:* The Construction Code Act should be revised to:
    - Remove the requirement that new provisions are cost-effective within seven years; and
    - Require LARA to conduct an energy code update every three years.

- **Pass new legislation to require state agencies, including DTMB, EGLE, LARA, LEO, MDOT, the MPSC, and others, to use the state's 100,000 charger/2 million EV deployment goal in their planning and evaluation criteria.**

  Note: This is complementary to an executive recommendation listed in *Section 7.1: Executive Recommendations*.

  — *Background:* For details, refer to *Section 7.1: Executive Recommendations*.

  — *Recommendations:* The metrics outlined in the MI Future Mobility Plan and MI Healthy Climate Plans were developed with significant cross-departmental collaboration. Accordingly, the legislature should pass new legislation requiring that all state departments and offices align their planning around these goals to ensure that all government leaders are working towards a common objective.

- **Adopt incentives in the state budget to enable the adoption of new and used (owned and leased) light-, medium-, and heavy-duty EVs for public and private fleets, prioritizing those operating primarily in DACs.**

  Note: This recommendation is complementary to an executive recommendation listed in *Section 7.1: Executive Recommendations*.

  — *Background:* For details, refer to *Section 7.1: Executive Recommendations*.

  — *Recommendations:* In the state budget, legislators should include rebates, tax credits, and grants to reduce the upfront costs of electrifying fleet vehicles and installing the necessary charging infrastructure. Additionally, funding should support pilot programs and demonstration projects to showcase the benefits and feasibility of EVs in various commercial and community settings, as well as niche charging infrastructure that support both the fixed and stop-and-go routes of fleet vehicles. The incentives should be accessible to a diverse range of consumers, including small businesses, municipalities, and large corporations, to ensure widespread market penetration. Boilerplate language for these incentives should prioritize the decarbonization of fleet vehicles that operate primarily in DACs.

[740] Michigan Legislature. Michigan Public Act 230 of 1972. "Stille-DeRossett-Hale Single State Construction Code Act." 1972. Available at https://www.legislature.mi.gov/Laws/MCL?objectName=MCL-ACT-230-OF-1972.

- **Adopt incentives in the state budget to enable the adoption of new and used (owned and leased) passenger EVs, targeting incentives toward moderate and low-income buyers.**

  Note: This recommendation is complementary to an executive recommendation listed in *Section 7.1: Executive Recommendations*.

  — *Background:* For details, refer to *Section 7.1: Executive Recommendations*.

  — *Recommendations:* In the state budget, the legislature should include new incentives specifically designed to encourage the adoption of both new and used light-duty EVs for residential users. These incentives could include tax credits, rebates, and grants to lower the purchase price or lease costs of EVs, making them more affordable for a broader range of consumers. An equity lens should be applied to provide the greatest incentives to LI drivers, ensuring that the benefits of EV ownership are accessible to all. Additionally, the incentives could include step-ups for "super-commuters" who drive longer distances than an average driver, recognizing the additional environmental benefits of converting high-mileage vehicles to electric.

- **Pass new legislation ensuring homeowners and renters living in condominiums and MFH cannot be unreasonably prevented from installing EV chargers.**

  — *Background:* There has been a movement in certain community associations to restrict homeowners' abilities to install EVSE in their homes. In Michigan, the Homeowners' Energy Policy Act (Public Act 68 of 2024) was signed into law on July 8, 2024. The new law makes HOA agreements that prohibit EVSE, as well as other energy-related technologies, invalid and unenforceable. The law also does not allow HOAs to require approval for installation of EVSE or any related maintenance, and it ensures HOA members are able to make any auxiliary changes needed for the installation of EVSE. The passage of this law was a significant step in reducing restrictions to installing EVSE in homes. However, additional steps will need to be taken to ensure those living in MFH properties (including in condominiums and apartment buildings) are able to install EVSE at or near their homes.

  — *Recommendations:* The legislature should pass new legislation to prevent and invalidate prohibitions on EVSE for homeowners and renters living in condominium and MFH properties.

- **Pass new legislation establishing tax credits for local businesses, to transition from ICE vehicles to EVs, paired with technical support for entities located in DACs and rural areas.**

  — *Background:* Businesses of all sizes play a significant role in the transition to zero-emission transportation, as they operate large and small fleets that contribute substantially to transportation-related emissions. However, the higher upfront costs of EVs and the required charging infrastructure pose financial challenges, particularly for small and medium-sized enterprises. Providing targeted financial incentives can help overcome these barriers, promoting widespread EV adoption across diverse business sectors and ensuring broad market penetration.

  — *Recommendations:* The legislature should pass new legislation establishing tax credits to support small, medium, and large businesses in transitioning from ICE vehicles to EVs. These tax credits could scale based on business size, ensuring that all businesses, regardless of their financial capacity, can benefit from the transition. Additionally, the legislation should encourage bulk purchases and fleet conversions to maximize the environmental impact.

- **Pass new legislation to align EVSE reliability standards among utility programs, state grant programs, and local funding programs to follow the NEVI guidance related to uptime.**

  Note: This recommendation is complementary to executive and regulatory recommendations. For details, see *Section 7.1: Executive Recommendations*.

Section 7.4: Additional Recommendations

The following policy recommendations are lower in priority but nonetheless may be important to achieving the state's goals. As in Sections 7.1, 7.2, and 7.3, these additional recommendations are categorized as executive, legislative, and regulatory in nature.

Executive Recommendations

- **Install EVSE at all state-owned buildings and parking lots.**
  - *Background:* In alignment with Executive Directive 2023-5, which required the transition of the state fleet to ZEVs,[741] it is essential to have adequate EVSE infrastructure in place at state-owned buildings and parking lots. By upgrading its infrastructure, the state can lead by example, encouraging wider EV adoption and supporting employees and visitors who use EVs. Moreover, in areas where state parking lots are publicly accessible, this initiative can provide much-needed public charging options, benefiting the broader community and addressing gaps in the existing charging network.
  - *Recommendations:* Another executive directive should be issued to require the installation of EVSE at all state-owned buildings and parking lots. This directive should build on the planning and implementation strategy being conducted by DTMB to transition the state fleet to EVs. Where applicable, the installed EVSE should be accessible to both employees at those locations and the public.
- **Continue engagement with the REV Midwest Coalition to ensure a comprehensive regional network of EV chargers.**
  - *Background:* In 2021, the Governors of Michigan, Illinois, Indiana, Wisconsin, and Minnesota signed an MOU to form the REV Midwest Plan. The MOU aims to accelerate EV adoption across the Midwest by coordinating policies, infrastructure development, and market growth strategies. A comprehensive regional EV charging network is crucial for supporting long-distance travel for passenger and freight vehicles, enhancing the convenience and appeal of EVs, and ensuring seamless connectivity across state borders. Continued engagement with REV Midwest will allow Michigan to collaborate on best practices, leverage shared resources, and maintain a unified approach to EV infrastructure development, fostering regional economic growth and environmental benefits.
  - *Recommendations:* Michigan should seek to lead and continue active participation with the signatory states of REV Midwest to ensure the development of a comprehensive regional EV charging network. The state of Michigan should engage partner states in the Midwest to focus on identifying key interstate travel corridors that require charging infrastructure, coordinating funding opportunities, and harmonizing regulatory frameworks to facilitate charger installation and operation. Additionally, leveraging the coalition to advocate for federal support and investments can enhance the region's capabilities. Interstate partnerships will be critical for communities close to Michigan's borders where cross-border travel is common.

[741] Executive Office of the Governor. Executive Directive 2023-5: Conversion of State Fleet. December 2023. Available at https://www.michigan.gov/whitmer/news/state-orders-and-directives/2023/12/05/executive-directive-2023-5-conversion-of-state-fleet.

- **Continue public awareness campaigns to educate consumers about the benefits of EVs, charging options, and existing incentive programs to encourage widespread adoption.**

  — *Background:* Just as local governments must work to overcome challenges and identify opportunities to enable local vehicle electrification, so too do residents, commercial operators, and fleet operators. Each of these parties all have questions regarding EV adoption and choosing the right EVSE to meet their needs, yet each come with their own set of unique challenges to address. The state of Michigan and local units of government have a critical role to play in communicating with these different community segments to support them in their transition to vehicle electrification and help to navigate the steps for communities to take to allow a more seamless transition. Online and printed materials that can help guide different constituents to address their questions can be incredibly valuable, and the development of useful resources can help to minimize costly errors that may otherwise lead to frustration or project abandonment.

  — *Recommendations:* EGLE should develop a program similar to Colorado's EV CO[742] to inform potential customers of education opportunities and connect different stakeholders with valuable resources, assistance, and incentive opportunities.

- **Conduct an impact assessment of mechanisms to support road funding and begin piloting the most promising options.**

  — *Background:* In 1999, the average fuel efficiency for a new ICE light-duty vehicle was 28.3 miles per gallon (mpg), compared to 40.8 mpg in 2019.[743] This means that ICE drivers are filling their gas tanks less frequently and therefore, paying less in total per gallon gas taxes. Additionally, EV drivers, who power their vehicles with electricity, never pay a gas tax. While drivers likely prefer these reduced costs, it has also created a steady decline in gas tax revenue since 2007.[744] Both the Federal and state governments historically have relied on gas tax revenues to provide funding for road construction, maintenance, and repair.[745] In recent years, however, due to these factors as well as rising labor and materials costs, the deficit between gas tax revenue and available transportation funding has continued to increase. According to a Michigan Infrastructure and Transportation Association (MITA) study, that funding gap in Michigan amounted to $3.9 billion in 2023.[746] Michigan is not alone in this challenge. In 2021, the Pennsylvania Department of Transportation indicated that it faced a $9.35 billion funding gap that continues to grow.[747] Michigan, like the rest of the country, therefore, needs to identify new solutions to close the funding gap. One part of the solution is going to entail addressing how to fairly include EVs as a revenue source without disproportionately burdening EV drivers or the EV market.[748] Unfortunately, a rising trend has been to place punitive fees on EV drivers that typically exceed what they would have paid in a gas tax, which may dissuade EV adoption in the future.[749]

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[742] State of Colorado. EV CO. "About EV CO." Accessed June 2024. Available at https://evco.colorado.gov/about.

[743] Bureau of Transportation Statistics. "Average Fuel Efficiency of U.S. Light Duty Vehicles." Accessed June 2024. Available at https://www.bts.gov/content/average-fuel-efficiency-us-light-duty-vehicles.

[744] Puentes, R. Brookings Institute. "The Problem with the Gas Tax in Three Charts." June 2015. Available at https://www.brookings.edu/articles/the-problem-with-the-gas-tax-in-three-charts/.

[745] Plug In America. "EV Road Usage Fees: A 3-Step Guide for States." July 2023. Available at https://pluginamerica.org/policy/ev-road-usage-fees/.

[746] Michigan Infrastructure and Transportation Association. "Michigan Transportation Infrastructure Needs and Funding Solutions." March 2023. Available at https://www.house.mi.gov/Document/?Path=2023_2024_session/committee/house/standing/transportation,_mobility_and_infrastructure/meetings/2023-03-07-1/documents/testimony/MITA%20Misc%20Docs.pdf.

[747] Pennsylvania Department of Transportation. "Pennsylvania Transportation Funding Options 2021: Choices for a fair and comprehensive funding solution." March 2021. Available at https://www.penndot.pa.gov/about-us/funding/Documents/TROC-Meeting_03-25-21/PA-Transportation-Funding-Options-2021_3-22-2021.pdf.

[748] Plug In America. "EV Road Usage Fees: A 3-Step Guide for States." July 2023. Available at https://pluginamerica.org/policy/ev-road-usage-fees/.

[749] Harto, C. and S. Baker-Branstetter. "Rising Trend of Punitive Fees on Electric Vehicles Won't Dent State Highway Funding Shortfalls but Will Hurt Consumers." *Consumer Reports.* September 2019. Available at https://advocacy.consumerreports.org/wp-content/uploads/2019/09/Consumer-Reports-EV-Fee-analysis.pdf.

— *Recommendations:* While the MITA study identifies several opportunities to support road funding, it does not directly address EVs. The state of Michigan should coordinate a multi-stakeholder working group to develop and recommend innovative road funding solutions to improve the state's road funding gap without unfairly punishing EV drivers. Additionally, the state should begin to pilot some of the most promising solutions.

- **Create a resource for dealerships selling EVs, providing them with tools to better navigate the unique ecosystem of EVs and EVSE and connecting them with funding and training opportunities.**

  — *Background:* A recent study shows that approximately 75% of EV owners expect dealers to be knowledgeable on topics of importance to new EV owners, but also found that the traditional, high-pressure ICE auto sales model leads to customer hesitation and frustration.[750] Potential EV buyers are not only looking to dealerships for information about the vehicle, but about the charging requirements and different incentives available to them. Just as municipalities require education on how to prepare for increased EV adoption in their communities, so too do local auto dealerships on the different technologies and incentive programs. To effectively inform the EV-curious customer and serve the growing EV market, it is, therefore, incredibly important that vehicle salespeople continue to have regular communication with automotive OEMs, utilities, and municipalities.

  — *Recommendations:* The state should develop a toolkit in collaboration with organizations like MICHauto, automotive OEMs, and electric utilities to help dealerships to better prepare for increased EV adoption. This toolkit should include:
    - Information about the IRS ECO portal[751] to allow dealers to offer the $7,500 EV tax credit at the point-of-sale;
    - Funding opportunities for installing EVSE on the dealership's property;
    - Guidance on different types of EVSE for sales personnel to provide to customers; and
    - Details on different utility rebates to provide to customers.

Regulatory Recommendations

- **Establish education opportunities with interested stakeholders to communicate developments in the transportation electrification landscape to Commissioners and Staff.**

  — *Background:* Innovation in recent years has been rapid in the transportation electrification space. Developments in fields including managed charging, V2X, DER management, AI and data processing are rapid. Given the lag between innovation and policy development, it will be useful to continue to create spaces where information can be shared about best practices in other states, exciting new pilot ideas, technological innovations, etc. between members of the industry and the Commissioners and Staff at the MPSC. For example, in January 2024, the MPSC held a two-day technical conference to explore many of the ongoing trends and innovations in transportation electrification.[752]

  — *Recommendations:* The MPSC should continue to create spaces to learn about the latest trends and innovations in the transportation electrification space.

[750] Perficient. "Consumers Expect More from Automakers and Dealers." Accessed June 2024. Available at https://www2.perficient.com/electric-vehicle-customer-journey-research.

[751] U.S. Internal Revenue Service. "Register your Dealership to Enable Credits for Clean Vehicle Buyers." Accessed June 2024. Available at https://www.irs.gov/credits-deductions/register-your-dealership-to-enable-credits-for-clean-vehicle-buyers.

[752] Michigan Public Service Commission. "Docket No. U-21492: In the Matter to Open a Docket that Will Be Used to Collaboratively Consider and Address Issues and Concerns Related to Use and Deployment of Electric Vehicles in a Commission-sponsored Technical Conference." March 15, 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000CW7TZAA1.

- **Ensure that interconnection applications are not required for V2B use cases.**

  — *Background:* When considering interconnection issues related to V2X systems, it is important to consider separately those systems in which the vehicle is not exporting electricity to the grid and those systems in which the vehicle may be exporting power directly to the grid. In the first case (i.e., V2B), the vehicle is being charged and providing power only on-site when there is a power outage. In this manner, the vehicle operates like a more traditional diesel back-up generator. As such, in a similar fashion to back-up generators, use of a V2B system should not require an interconnection application. For example, in Michigan, Consumers Energy's draft interconnection procedures state that "An electric vehicle that operates solely as a load is not considered a [distributed energy resource] for purpose of this definition,"[753] meaning that an interconnection application is not necessary for such EVs.

  — *Recommendations:* In revised interconnection standards or in utility procedures, it should be clarified consistently that V2B systems do not require interconnection applications and should be treated in the same manner as diesel back-up generators.

- **Encourage the adoption of performance incentive mechanisms for metrics related to interconnection and energization timelines and minimizing the peak load impacts of EV charging.**

  — *Background:* As the grid continues to evolve and new technologies become available for meeting grid needs, including improving reliability, properly aligning utility financial incentives with desired outcomes is paramount. The MPSC has been considering the creation of financial incentives and disincentives through an open workgroup and two open dockets (Case No. U-20147[754] and Case No. U-21122[755]). These financial incentives are generally called performance incentive mechanisms (PIMs). PIMs must be thoughtfully designed and implemented to ensure that they align with public policy goals, produce customer benefits, and provide meaningful but appropriate earnings opportunities within the broader utility business model. Although the MPSC is initially considering PIMs related to reliability, future PIMS could be related to interconnection or EV charging station energization metrics. For example, several states including Colorado[756] have recently undertaken legislative and regulatory efforts to clarify issues including timelines, cost-sharing, and requirements associated with these interconnection applications.

  — *Recommendations:* The MPSC should explore the adoption of PIMs to encourage utilities to improve EV charging station energization times.

- **Ensure that customers understand EV TOU rates and are able to choose rates that are most cost-effective.**

  — *Background:* As Michigan's utilities move to fully deployed TOU rates, it is important that customers understand the rate structures and the impact of their behaviors on utility bills.[757] EV customers, for example, often have a choice between a whole-home TOU rate and an EV-specific rate. It may vary, customer-to-customer, which of these rates makes the most economic sense.

  — *Recommendations:* To educate customers and provide accurate bill information, Michigan's utilities should provide "shadow billing" to show what a customer could expect to pay given their actual usage under different tariff options.

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[753] Consumers Energy. Case No. U-21480. "Consumer Energy Company's Application for Approval of Interconnection Procedures and Forms." March 2024. Available at https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y00000Ce5QBAAZ.

[754] Michigan Public Service Commission. "Docket No. U-20147: In the Matter to Open a Docket for Certain Electric Utilities to File their Distribution Investment and Maintenance Plans." April 12, 2018. Available at https://mi-psc.my.site.com/s/case/500t0000009gHerAAE/in-the-matter-on-the-commissions-own-motion-to-open-a-docket-for-certain-regulated-electric-utilities-to-file-their-distribution-investment-and-maintenance-plans-and-for-other-related-uncontested-matters.

[755] Michigan Public Service Commission. "Docket No. U-21122: In the Matter to Review the Response of Alpena Power Company, Consumers Energy Company, DTE Energy Company, Indiana Michigan Power Company, Northern States Power Company, Upper Michigan Energy Resources Corporation, and Upper Penninsula Power Company to Recent Storm Damage in their Service Territories." August 19, 2021. Available at https://mi-psc.my.site.com/s/case/500t000000puuoiAAA/in-the-matter-on-the-commissions-own-motion-to-review-the-response-of-alpena-power-company-consumers-energy-company-dte-electric-company-indiana-michigan-power-company-northern-states-power-company-upper-michigan-energy-resources-corporation-and.

[756] Colorado Legislature. Senate Bill 218. 2024. Available at https://leg.colorado.gov/bills/sb24-218.

[757] Citizens Utility Board of Michigan. "The ABCs of Michigan EVs: A Policy Guide to Electrify Michigan." Accessed June 2024. Available at https://d3n8a8pro7vhmx.cloudfront.net/cubofmichigan/pages/1232/attachments/original/1639585755/The_ABCs_of_Michigan_EVs_Final_for_Website.pdf?1639585755.

Legislative Recommendations

- **Pass new legislation that allows EVSE installed in parking lots to count toward parking minimums and that ADA-sized parking spaces count as two spaces for the purposes of parking minimums.**

  — *Background:* Some parking spaces with EVSE are wider to accommodate the high-powered charging equipment. Consequently, the addition of EV charging spaces to existing parking may violate a municipality's minimum parking requirements. While no federal regulations exist that specify any ADA-compliant accessibility standards in relation to EVSE, in August 2023, the U.S. Access Board indicated in its Spring 2023 Unified Agenda that it planned to propose rules for EVSE accessibility.[758] Once these rules are proposed, there will be a period for responses before a final ruling is made. Because of current coverage by ADA compliance, several areas that may install EVSE, including state and local government offices, public parks, municipal building parking lots, state- and local-government provided housing, federal fleet depots, rest stops along the Interstate Highway System, and more, are already required to meet ADA standards.[759]

  — *Recommendations:* To ensure that parking spaces with EVSE or with make-ready equipment do not encroach on parking requirements, and to ensure that these parking spaces are accessible, the legislature should pass new legislation that allows EV-C, EV-R, and EV-I parking spaces count as at least one standard parking space and that ADA accessible EV parking spaces count as two parking spaces.

- **Pass new legislation creating incentives to retain and attract EV and EVSE supply chain participants along the entire value chain.**

  — *Background:* In December 2021, the Michigan Legislature passed a bipartisan economic development bill that established the Strategic Outreach Attraction Reserve (SOAR) fund.[760] This fund was designed to provide incentives for large-scale private investments within the state, and it has successfully attracted millions of dollars in private investment, creating thousands of new jobs statewide.[761] A significant portion of these investments has been directed toward the clean energy sector, including multiple projects in the EV sector.[762] Across the Midwest, there has been an often-documented loss of human talent over the last several decades. This movement of college-educated or technically trained experts from the Midwest to other regions of the country, including the east and west coasts, causes workforce challenges in states like Michigan that are different from those faced in other parts of the country.[763] It is clear that the growing clean energy economy is an opportunity to regain and attract those talented individuals back to the Midwest.

  Michigan has a unique opportunity to attract talent in the transportation electrification space given the state's historical leadership in the automotive industry. In 2022, there were 1.1 million automotive or mobility jobs in Michigan, representing 20% of the state's total workforce.[764] In addition, new "Made in America" rules are being

[758] Office of Information and Regulatory Affairs. "Accessibility Guidelines for Electric Vehicle Charging Stations." Fall 2023. Available at https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202310&RIN=3014-AA48.

[759] United States Access Board. "Design Recommendations for Accessible Electric Vehicle Charging Stations." Accessed June 2024. Available at https://www.access-board.gov/tad/ev/.

[760] Executive Office of the Governor. "Gov. Whitmer Signs Bipartisan Economic Development Bill to Strengthen Economy, Create Good-Paying Jobs." October 2022. Available at https://www.michigan.gov/whitmer/news/press-releases/2022/10/04/whitmer-signs-bipartisan-economic-development-bill-to-strengthen-economy.

[761] Michigan Development Guide. "Michigan Drives the Automotive Industry Into the Future." 2023. Available at https://siteselection.com/cc/michigan/2023/michigan-drives-the-automotive-industry-into-the-future.cfm#:~:text=In%202022%2C%20Michigan%20attracted%20more,wave%20of%20innovation%20and%20expansion.

[762] Pohl, S. Michigan Economic Development Corporation. "This Just In: Gov. Whitmer approves additional investment in SOAR Fund to attract transformational projects to the state." October 2022. Available at https://www.michiganbusiness.org/press-releases/2022/10/tji-whitmer-approves-additional-investment-in-soar-fund-attract-transformational-projects-to-state/.

[763] Pope, A. "Midwest 'brain drain' Persists and Job Opportunity is the Main Driver." *NPR.* February 2024. Available at https://www.kcur.org/news/2024-02-02/midwest-brain-drain-persists-and-job-opportunity-is-the-main-driver.

[764] Detroit Regional Chamber. "Automotive and Mobility." Accessed June 2024. Available at https://www.detroitchamber.com/research/regional-overview/industries/automotive-mobility/#:~:text=1.1%20million%20automotive%20or%20mobility,6x%20higher%20than%20national%20average.

phased in from 2024 to 2027 to encourage increased domestic production.[765] As such, Michigan is in a prime position to maintain, and even strengthen, its position as a leader in automotive production and innovation. Attracting and retaining key players along the entire EV value chain, from body construction to battery production and recycling, will be paramount not only to attract strong talent to the state, but also to ensure long lasting development to bolster Michigan's economy.

- *Recommendations:* The SOAR fund should be extended and retained to attract clean mobility and advanced energy businesses, talent, and jobs to Michigan.

- **Pass new legislation requiring that any new heavy-duty truck parking be built EV-R or EV-I.**
  - *Background:* As Michigan advances its clean mobility initiatives, ensuring that new heavy-duty truck parking areas support EV charging infrastructure is critical. By making new truck parking EV-R or installing EVSE from the outset, the state can facilitate the transition to electric heavy-duty trucks. This proactive approach helps to avoid future retrofitting costs. With the increasing adoption of electric trucks, having accessible and reliable charging infrastructure is essential to support long-haul routes and reduce emissions.
  - *Recommendations:* Michigan should pass new legislation mandating that all new heavy-duty truck parking facilities be built either EV-R or EV-I. This legislation should specify requirements for the necessary electrical infrastructure to support future EVSE installation and set standards for the number and type of chargers to be installed initially. Implementation will require collaboration with industry stakeholders, including truck stop operators, construction firms, and EVSE manufacturers, to ensure feasibility and cost-effectiveness. Providing incentives or grants to offset initial installation costs can encourage compliance and expedite infrastructure development.

[765] Krishner, T. and M. Daly. "US Loosens Some Electric Vehicle Battery Rules, Potentially Making More EVs Eligible for Tax Credits." *The Associated Press.* May 2024. Available at https://apnews.com/article/electric-vehicle-tax-credit-treasury-government-bcbbc0fd7eac8b970d419260c8ed577b.

APPENDICES

Appendix I.

EV readiness language that could be added to Michigan's residential code, including new definitions, and new Section R404.5 and revisions to Table R405.2 and Table R406.2:

Add new definitions as follows:

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current. Plug-in hybrid electric vehicles are electric vehicles having a second source of motive power. Off-road, self-propelled electric mobile equipment, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats and the like, are not considered electric vehicles.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors and the *electric vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

LEVEL 2 ELECTRIC VEHICLE SUPPLY EQUIPMENT (Level 2 EVSE). *Electric Vehicle Supply Equipment capable* of providing AC Level 2 EV charging.

EV READY SPACE. A designated *parking space* that is provided with an electrical circuit capable of supporting an installed *Level 2 EVSE* in close proximity to the proposed location of the EV parking space.

Add new section as follows:

R404.5 Electric vehicle charging infrastructure. Electric infrastructure for the current and future charging of *electric vehicles* shall be installed in accordance with this section. *EV ready spaces* are permitted to be counted toward meeting minimum parking requirements.

R404.5.1 One- and two- family dwellings and townhouses. One- and two-family dwellings and townhouses with a dedicated attached or detached garage or on-site parking spaces and new detached garages shall be provided with one EV ready space per dwelling unit. The branch circuit shall meet the following requirements:

1. A 208/240-volt circuit installations, including panel capacity, raceway wiring, receptacle, and circuit overprotection devices that are able to provide Level 2 charging
2. Terminates at a junction box or receptacle located within 3 feet (914 mm) of the parking space, and
3. The electrical panel directory shall designate the branch circuit as "For electric vehicle charging" and the junction box or receptacle shall be labelled "For electric vehicle charging".

R404.5.2 Group R occupancies. Parking facilities serving Group R-2, R-3 and R-4 occupancies shall comply with Section C405.15.

Revise table as follows:

TABLE R405.2
REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE

SECTION [a]	TITLE
Electrical Power and Lighting Systems	
R404.1	Lighting equipment
R404.2	Interior lighting controls
R404.5	Electric vehicle charging infrastructure

Revise table as follows:

TABLE R406.2
REQUIREMENTS FOR ENERGY RATING INDEX

SECTION [a]	TITLE
Electrical Power and Lighting Systems	
R404.1	Lighting equipment
R404.2	Interior lighting controls
R404.5	Electric vehicle charging infrastructure
R406.3	Building thermal envelope

Appendix II.

EV readiness language that could be added to the commercial code, including new definitions, revisions to C401.2.2 and and Table C405. 12.2, and new section C405.14:

Add new definitions as follows:

AUTOMATIC LOAD MANAGEMENT SYSTEMS (ALMS). A control system that allows multiple connected *EVSE* to share a circuit or panel and automatically reduce power at each charger, reducing the total connected electrical capacity of all *EVSE*.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current. Plug-in hybrid electric vehicles are electric vehicles having a second source of motive power. Off-road, self-propelled electric mobile equipment, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats and the like, are not considered electric vehicles.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors and the *electric vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) SPACE. A parking space that is provided with a dedicated *EVSE*.

EV CAPABLE SPACE. A parking space that is provided with some of the infrastructure necessary for the future installation of an *EVSE* – such as conduit, raceways, electrical capacity, or signage – or reserved physical space for such infrastructure.

EV READY SPACE. A parking space that is provided with an electrical circuit capable of supporting an installed *EVSE*.

Revise text as follows:

C401.2.2 ASHRAE 90.1

Commercial buildings shall comply with the requirements of ANSI/ASHRAE/IESNA 90.1 and Section C405.14.

Revise text as follows:

TABLE
C405.12.2 ENERGY USE CATEGORIES

LOAD CATEGORY	DESCRIPTION OF ENERGY CUSE
Total HVAC system	Heating, cooling and ventilation, including but not limited to fans, pumps, boilers, chillers, and water heating. Energy used by 120-volt equipment, or by 208/120-volt equipment that is located in a building where the main service is 480/277-volt power, is permitted to be excluded from total HVAC system energy use.
Interior lighting	Lighting systems located within the building.
Exterior lighting	Lighting systems located on the building site but not within the building.
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets.
Process load	Any single load that is not included in HVAC, lighting or plug load category and that exceeds 5% of the peak connected load of the whole building, including but not limited to data centers, manufacturing equipment, and commercial kitchens.
Electric vehicle charging	*Electric vehicle charging loads.*
Building operations and other miscellaneous	The remaining loads not included in this table, including but not limited to vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas and snow-melt systems.

Add new sections as follows:

C405.14 Electric vehicle charging infrastructure. Parking facilities shall be provided with electric vehicle charging infrastructure in accordance with this section and Table C405.14 based on the total number of parking spaces and rounded up to the nearest whole number. *EVSE*, *EV ready spaces* and *EV capable spaces* may be counted toward meeting minimum parking requirements. *EVSE spaces* may be used to meet requirements for *EV ready spaces* and *EV capable spaces*. *EV ready spaces* may be used to meet requirements for *EV capable spaces*. An *ALMS* may be used to reduce the total electrical capacity required by *EVSE spaces* provided that all *EVSE spaces* are capable of simultaneously charging at a minimum rate of 1.4 kW. Where more than one parking facility is provided on a building site, the number of parking spaces required shall be calculated separately for each parking facility.

Exception: In parking garages, the conduit required for *EV capable spaces* may be omitted provided the parking garage electrical service has no less than 1.8 kVA of additional reserved capacity per *EV capable space*.

TABLE C405.14
ELECTRIC VEHICLE CHARGING INFRASTRUCTURE REQUIREMENTS

OCCUPANCY	*EVSE SPACES*	*EV READY SPACES*	*EV CAPABLE SPACES*
Group B Occupancies	15%	NA	40%
Group M Occupancies	25%	NA	40%
R-2 Occupancy	NA	100%	NA
All other Occupancies	10%	NA	40%

a. Or one *EV ready space* per *dwelling unit*.

C405.14.1 EV Capable Spaces. *EV Capable Spaces* shall be provided with electrical infrastructure that meets the following requirements:

1. Conduit that is continuous between a junction box or outlet located within 3 feet (914 mm) of the parking space and an electrical panel serving the area of the parking space
2. The electrical panel to which the conduit connects shall have sufficient dedicated physical space for a dual-pole, 40-amp breaker
3. The conduit shall be sized and rated to accommodate a 40-amp, 208/240-volt branch circuit and have a minimum nominal trade size of 1 inch
4. The electrical junction box and the electrical panel directory entry for the dedicated space in the electrical panel shall have labels stating "For future *electric vehicle* charging"

C405.14.2 EV Ready Spaces. The branch circuit serving *EV Ready Spaces* shall meet the following requirements:

1. Wiring capable of supporting a 40-amp, 208/240-volt circuit,
2. Terminates at an outlet or junction box located within 3 feet (914 mm) of the parking space,
3. A minimum capacity of 1.8 kVA.
4. The electrical panel directory shall designate the branch circuit as "For electric vehicle charging" and the junction box or receptacle shall be labelled "For electric vehicle charging."

C405.14.2 EVSE Spaces. The *EVSE* serving *EVSE spaces* shall be capable of supplying not less than 6.2 kW to an electric vehicle and shall be located within 3 feet (914 mm) of the parking space.

Appendix III.

Actions for Bronze, Silver, and Gold EV Ready Designations for EVs and EVSE[766]

BRONZE	*SILVER*	*GOLD*
All fundamental Bronze actions + 30 extra points	All fundamental Bronze actions + 24 important Silver + 30 extra points	All fundamental Bronze actions + All important Silver + 18 valuable Gold + 20 extra points
Commit to EV Readiness		
• Make public state supporting EV readiness. • Report baseline metrics.		• Establish tracking and reporting metrics over time.
Zoning and Planning		
• Evaluate the zoning code for barriers to EVSE development. • Classify EVSE as accessory use where applicable. • Flex the number of required parking spaces to accommodate Level 2 and DCFC where parking minimums exist.	• Clearly define EV and EVSE to be considered in zoning code • Establish zoning regulations to facilitate EVSE installations and clearly communicate rules. • Establish or clarify advertising rules for EVSE. • Establish or clarify "right of way" for EVSE. • Establish or clarify aesthetic requirements for public EVSE.	• Evaluate community needs based on occupancy types of community locations, and prioritize EVSE installations for equity.
Permitting and Inspection		
• Develop a clear and code-compliant permitting and inspection process for SFH EVSE installations. • Develop a clear and code-compliant permitting and inspection process for MFH and commercial EVSE installations. • Post standard EVSE checklist, permitting forms, and approval requirements online. • Establish reasonable standard permitting and inspection fee structures. • Advise constituents that EVSE installers should be registered with the Illinois Commerce Commission (ICC).	• Provide a list of applicable local, state, and federal codes, laws, regulations, and suggested best practices for EVCSs to assist developers and installers. • Process EVSE standard permit applications within 10 business days. • Complete EVSE inspections no more than 5 business days after installation is complete. • Provide online access to lists of ICC-certified EVCS installers and registered contractors. • Advise MFH and commercial applicants of additional application requirements due to increased load. • Train staff on municipal EVSE permitting and inspection procedures.	• Require EVSE installers applying for permits be registered with the ICC. • Establish or clarify rules for non-permitted or non-compliant EVSE installations. • Establish or clarify rules for non-compliant operations and maintenance.

[766] Metropolitan Mayors Caucus. "EV Readiness Checklist." 2023. Available at https://mayorscaucus.org/wp-content/uploads/2023/08/EV-Readiness-Checklist-3.0-for-web.xlsx.

Safety and Training		
• Provide awareness training of EVs and EVSE to first responders and public safety personnel.	• Provide EV and EVSE safety information to the public.	• Provide hands-on training of EVs and EVSE to first responders and public safety personnel. • Provide first responders with Emergency Guides for EVs and EVSE. • Adopt standard operating procedures for emergency incidents involving EVs and EVSE.
Parking and Access		
• Communicate provisions of ILCS 625 ILCS 5/11-1308 and/or local parking code regarding unauthorized use of EV parking by non-EVs at public and private properties.	• Identify and promote EVSE by sharing digital EVSE locating tools.	• Design parking rules to safely and equitably allow access, while matching charging type, physical space, land use, occupancy type, and type of parking.
New Construction		
	• Establish targets and timelines for making all new construction EV Capable, EV Ready and/or EVSE Installed, as applicable. Tailor targets for single-family residential, multi-family residential and commercial construction. • Communicate and enforce provisions of the Illinois Electric Vehicle Charging Act (Public Act 103-0053), which requires new construction projects for single-family and multi-family dwellings to be EV Capable and provides a right to charge for residents.	• For commercial development, require a proportion of parking spaces to be EV Capable, EV Ready and/or EVSE Installed. Establish requirements for L2 and DCFCs, maximum electrical amperage for each parking space and power capacity for electrical panels. • Make public properties EV Capable or EV Ready during new construction and renovations.
Access to EV Charging		
	• Provide consumer resources on EVs and EVCSs, to help residents make informed purchasing decisions.	
Municipal Fleets		
	• Assess municipal fleet to understand current operational requirements and usage characteristics, and to identify suitable applications for EVs. • Identify EVs to suit fleet needs. Compile information on vehicle requirements, operating and capital costs, and warranty and maintenance information. Investigate upcoming EV models. • Assess fleet charging needs, including physical and operational requirements, projected daily energy requirements, EVCS, and associated investment. Engage the utility early in the process. • Forecast Return on Investment. • Estimate and report environmental and community benefits from the electric fleet, including greenhouse gas and pollution reduction.	• Create multi-year purchasing plans that include right-sizing vehicles, current and future EV availability, vehicle retirement, and budgetary constraints. • With the utility, evaluate potential locations for EVCSs based on operational suitability, access, short- and long-term power capacities, and retrofits or new construction required. • Train appropriate in-house staff to operate EVs and EVCSs. • Evaluate sharing municipal EVCSs with the public. • Procure and operate electric vehicles in the municipal fleet. • Track fleet EV metrics over time, such as vehicle miles traveled, number of charging events, comparative fuel and maintenance costs; and GHG and other pollution avoided.

Utility Engagement		
• Encourage all EV owners to register with their utility.	• Educate residents about dynamic rate offerings.	
Community Engagement		
• Communicate EV readiness commitment and actions to constituents.	• Create and host an EV readiness landing page on municipal website.	
Market Development and Finance		
• Provide current information on incentives and grants to community. • Monitor existing and pending grants and incentive programs to be ready to deploy plans when funds become available.		• Promote Property Assessed Clean Energy (PACE) financing to businesses for large-scale EVCS

Appendix IV.

Detailed Profiles of State TEP Processes

Colorado

In September 2019, Colorado Governor Polis signed SB 19-077, which allows utilities in Colorado to earn a return on investment made to electrify transportation including rebates, and directs utilities to develop TEPs consistent with IRP Plans.[767] The legislation indicated that IOUs would need to file their plans by May 15, 2020 and every three years thereafter, with a maximum retail rate impact from the EV infrastructure of 0.5% of the IOU's annual revenue requirement. Applications must also seek to minimize costs and maximize benefits, which the Colorado Public Utilities Commission is to evaluate using several criteria, including the expectation or assurance the proposed expenditure would:

- Improve the use of the electric grid, including improved integration of renewables;
- Increase access to the use of electricity as a transportation fuel;
- Support a safe and reliable system design;
- Contribute to meeting air quality standards and reducing statewide greenhouse gas emissions;
- Stimulate innovation, competition, and increase customer choice;
- Attract private capital investments;
- Utilize high-quality jobs and training programs;
- Follow transparent public reporting requirements; and
- Support access to electric transport and electrification opportunities to LI customers and communities.

The legislation also provides further guidance on the employment of certified electricians, charging installation, and utility management training programs employees or contractors.

Illinois

Similarly, in September 2021, IL Governor Pritzker passed the Climate and Equitable Jobs Act (CEJA),[768] part of which amended the Electric Vehicle Act (EVA).[769] The amended EVA stated that utilities serving more than 500,000 customers needed to file Beneficial Electrification (BE) Plans by July 1, 2022 with a start date no later than January 1, 2023. Plans need to be updated every three years to describe the impact of the previous plan's programs as well as the impact of the currently proposed plan over the subsequent 24 months. Like the Colorado Public Utilities Commission, the Illinois Commerce Commission is to evaluate plans along eight public interest criteria and the expectation that the plans:

- Maximize total energy cost savings and rate reduction for participants and non-participants alike;
- Present significant opportunities for residents and businesses in EJ communities to participate in and benefit from electrification programs;
- Support 40%, at minimum, make-ready infrastructure investment to facilitate the deployment of EVSE in EJ, LI, and equity investment eligible communities;
- Support 5%, at minimum, EVSE and EV investment for electrification of MHD vehicles, school buses, and diesel public transportation vehicles located in or serving EJ, LI, and other equity investment eligible communities;
- Stimulate innovation, competition, and increased customer choice;
- Contribute to the reduction of carbon emissions and meeting air quality standards;
- Support the efficient and cost-effective use and development of the electric grid for EV charging operations; and
- Develop resources to support private investment in public and private EVSE.

Additionally, the EVA also outlined ten electrification program elements that the BE Plan would need to address, including the development and implementation of TOU rates and the minimization of the financial burden on ratepayer impacts. Based on these eight public interest criteria and ten program elements, the plan should be assessed for its cost-benefit ratio.

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[767] Colorado Legislature. Senate Bill 19-077. May 2019. Available at https://leg.colorado.gov/sites/default/files/documents/2019A/bills/2019a_077_enr.pdf.

[768] Illinois Environmental Protection Agency. Illinois Public Act 102-0662. "Climate and Equitable Jobs Act." April 2024. Available at https://epa.illinois.gov/topics/ceja.html#:~:text=CEJA%20includes%20provisions%20to%20phase,fuel%2Dfired%20electrical%20generation%20units.

[769] Illinois General Assembly. 20 ILCS 627. "Electric Vehicle Act." September 2020. Available at https://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3348&ChapterID=5.

Minnesota

Unlike Colorado and Illinois, which set TEP requirements in statute, Minnesota ordered TEP filings via a series of orders issued by the Minnesota Public Utilities Commission (MN PUC). In May 2014, Minnesota signed 216B.1614 into statute, which required each public utility to have a tariff specifically designed for EV charging that offered time-of-day or off-peak rates to customers who own EVs.[770] Based on this legislation, starting in 2019, the MN PUC issued a series of orders (E-999/CI-17-879) related to IOU TEP:[771]

- February 2019 - Order Making Findings and Requiring Filings - Required that utilities file TEP by June 30, 2019, identifying EV-related initiatives being considered by the IOUs over the next two years and how they propose to scale up current projects, pilots, and tariffs related to EVs;
- December 2019 - Order Accepting Filings and Establishing Requirements for Additional Filings - Required utilities to file TEPs annually and to report on a series of specific indicators, such as the number of EVs in an IOU's service territory, the demand and energy impact attributed to EVs, information on charging capabilities and usage forecasts for future EV adoption, and how the proposed programs and pilots optimize EV adoption;
- April 2021 - Order Accepting 2020 Transportation Electrification Plans, Adopting Additional Requirements, and Establishing Biennial Filing Requirement - Required IOUs to provide additional information on budgeting and cost-effectiveness of their EV programs.

The MN PUC approached TEP requirements as an iterative process that incorporated new elements to be included in the TEPs as expectations changed and industry understanding increased.

[770] Minnesota Legislature. 216B.1614 Electric Vehicle Charging Tariff. May 2014. Available at https://www.revisor.mn.gov/statutes/cite/216B.1614.

[771] Minnesota Public Utilities Commission. "Docket No. E-999/CI-17-879: Order Making Finding and Requiring Filings: In the Matter of a Commission Inquiry into Electric Vehicle Charging and Infrastructure." February 1, 2019. Available at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={10BBAA68-0000-C413-9799-DF3ED0978E75}&documentTitle=20192-149933-01.

Appendix V.

TEP portfolio categories

Portfolio Category	*Sub-Category*	*Description*
Residential	Single-Family Homes	These programs often come in the form of rebates for Level 2 charging or for the EV itself. Many IOUs offer a second tier of higher incentives for LI- and EJ-eligible customers.
	Multi-Family Homes	These programs may entail utility investment in and ownership of the infrastructure necessary to support the installation of EVSE, which is acquired and owned by the site host. This often varies, however, according to the site's parking environment. Many IOUs offer a second tier of higher incentives for LI- and EJ-eligible customer.
Commercial	Private Fleets	It is common for the commercial and public investment categories to be addressed as a single category. While several fleet types can be effectively served by Level 2 EVSE, these categories typically comprise the largest investment categories in TEP portfolios due to higher investments required to support higher voltage wiring and hardware of DCFC installations. Fleets, particularly those with set routes and schedules, also represent the greatest innovative opportunities in V2X applications, and thus are often the focus of V2X pilot programs.
	Public Transit Fleets	
	School Bus Fleets	
Public	Fully Public	Incentives in this category are often focused on DCFC to meet needs for faster charging, however it also includes Level 2 depending on the local circumstance and use case. Whether to install DCFC or Level 2 typically depends on the use case and the typical idle time that a vehicle would spend parked.
	Semi-Public	Incentives are largely focused on Level 2 given the longer idle time that the vehicle sits; however, Level 1 and DCFC can also be found in these settings depending on the use case and idle time.
Customer Education		These programs generally focus on raising awareness about EV capabilities as well as educating potential buyers on different types of charging.
Pilot Programs		The funds are typically focused on research and innovation opportunities. Currently, the primary focus is on managed charging and V2X pilot programs.