

Proposed Electric Vehicle DC Fast Charger Network for Michigan

Michigan Municipal Electric Association 2019 Fall Conference

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Electric Vehicles – Planning for the Future

Incentivize public and private investments in a light duty electric vehicle charging infrastructure across MI.

- Develop bare-bones DC fast charging network;
- Lower emissions from light duty vehicles; and
- Provide worry-free EV travel through MI by 2030

Electric Vehicles – Infrastructure

Michigan has limited charging infrastructure.¹

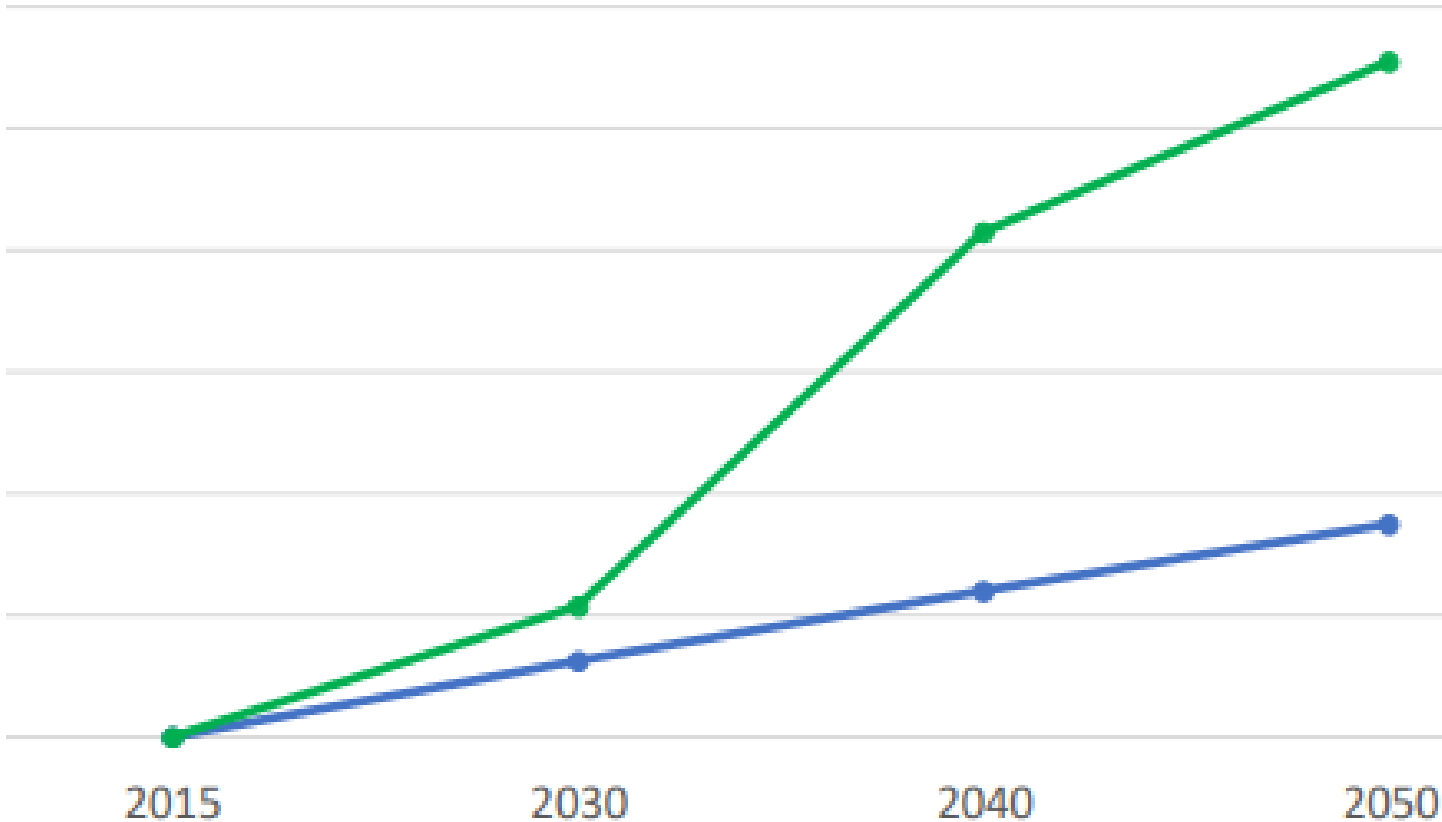
- <2% of U.S. DC fast charger ports
- 2.2% of U.S. Level 2 ports

However, Michigan has:

- Autonomous vehicle support (PA 332 of 2016)
- Investment in EVs from business sector (GM, Ford, Toyota, etc.), utilities, and others.

PEV Penetration by Scenario

—●— MISO (McKinsey) —●— Bloomberg



Electric Vehicle Market Projections

Two sources for MI EV projections:²

- MISO scenario:
 - 2020: 1.49%
 - 2025: 3.74%
 - 2030: 6%
- Bloomberg scenario:
 - 2020: 2.46%
 - 2025: 6.56%
 - 2030: 12%

where EV market share is the proportion of EVs to all vehicles on the road.

Electric Vehicle Charger Placement Considerations

Find the optimal DC fast charging infrastructure investment to support electric vehicle travel in Michigan to ensure travel continuity:

- **Where** to deploy charging stations?
- **How many** charging outlets must be built at each station?
- **What** is the approximate investment cost?

Simplified Road Reference Network

Reference road network:

Includes major cities & interstate highways.

Focuses on travel between cities.

Simplification Process:

Travel demand around major cities aggregated to city center.

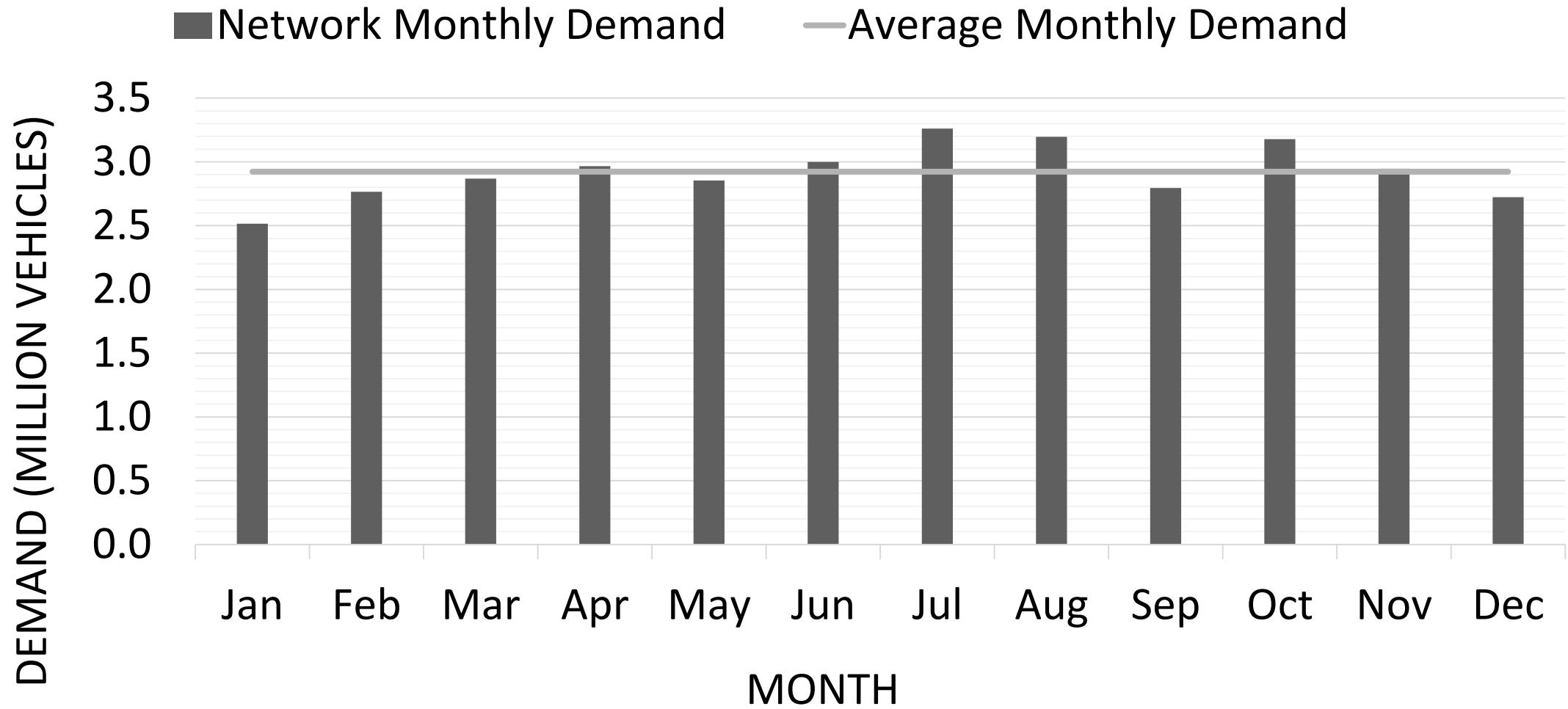
Travel demand within cities excluded.

Distance between candidate points < 50 miles.

Candidate points may or may not be selected for building charging stations



Travel Demand Per Monthly Average



Michigan Network Simulation

DYNASMART-P 2.0 [Michigan]

File Edit View Info Scenario About

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Network Attributes

- Zones
- Signals

Traffic Attributes

- Density
- Speed
- Queue Length
- Vehicles
- Travel Time Contour
- No Selection

Name	Value
Link ID	6192
From Node	8248
To Node	8252
Type	Arterial
Number of Lanes	1
Length (mi)	2.53
Sat Flow (veh/hu/h)	1000.00
Density (veh/mi/h)	3.96
Speed (mi/h)	37.78
Volume (veh/hu/h)	100.00
Queue (S/hu/mi)	0

Michigan.dwg

- Simulation Input Files
- GUI Input Files
- Output Files

PC Truck BUS

60 120 180 240 300 360 420 480 540 600 660 720 780 840 900 960 1020 1080 1140 1200 1260 1320 1380 1440 1500 1560 1620 1680 1740 1800 1860 1920 1980

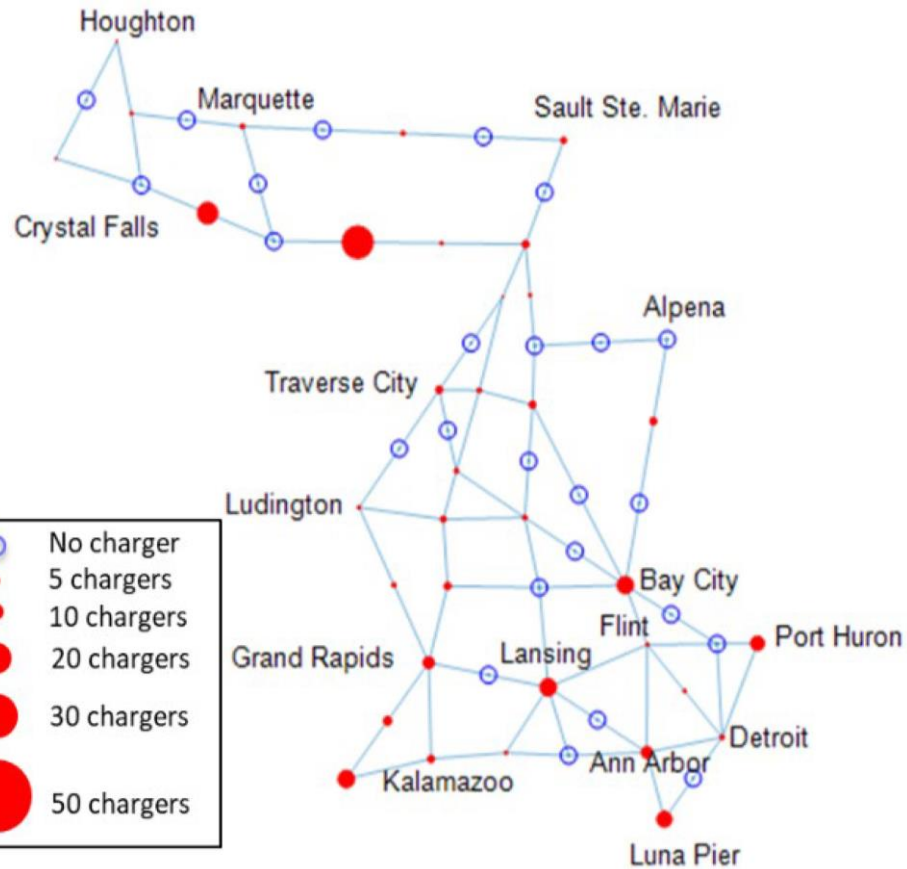
x:01477908.222180 y:-40822223.353451

NUM

Recommended EVCS Network – Highway & Tourism

Mixed scenario considered: 70 kWh battery, 150 kW charger

- Vehicles with smaller batteries or degraded batteries will be on road.

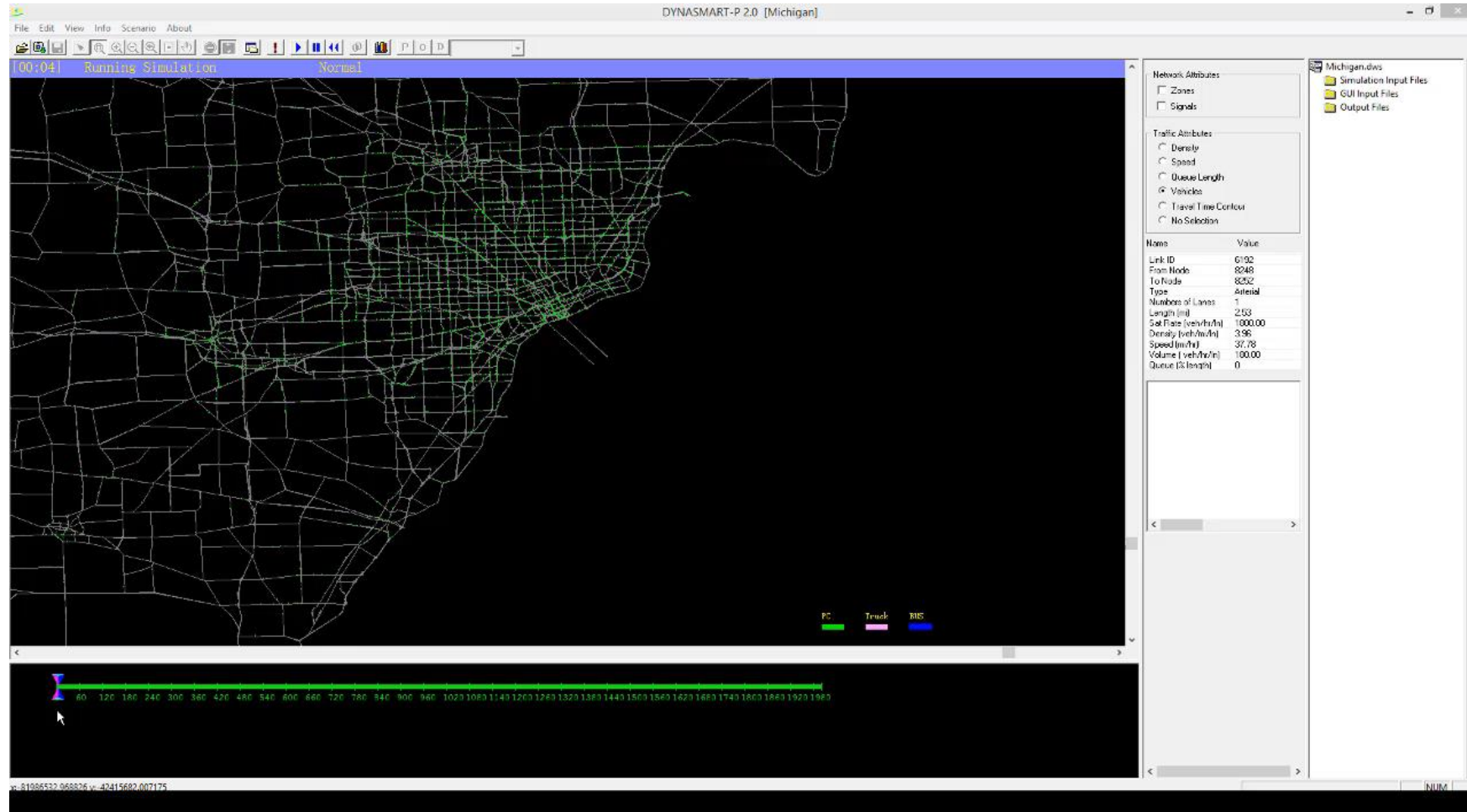


	Low-tech	High-tech	Mixed
Scenario Specification			
EV market share (%)	6	6	6
Charging power (kW)	50	150	150
Battery energy (kWh)	70	100	70
Optimum Charger Placement			
Number of charging stations	68	64	67
Number of charging outlets	760	255	296
Investment Cost			
Charging station cost (million dollars)	10.42	11.83	12.39
Land cost (million dollars)	1.44	0.48	0.56
Charging outlet cost (million dollars)	25.65	19.44	22.57
Total cost (million dollars)	37.51	31.76	33.52

Next Steps

- Post EV Charger Placement Optimization Report (Highway and Tourism) - January 2019;
- Kick-Off ChargeUp MI;
- EV readiness meetings with local government and economic development groups in April;

Detroit Traffic Simulation



Con't Next Steps

- Continue EV readiness meetings with local government and economic development groups
- Post RFP for Round 1 VW funding for DC EV charging infrastructure in Summer 2019;
- Complete Urban EVCS Study Fall 2019; and
- For further information, please see our website.

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