

# **Ann Arbor's Draft Electric Vehicle Readiness Ordinance**

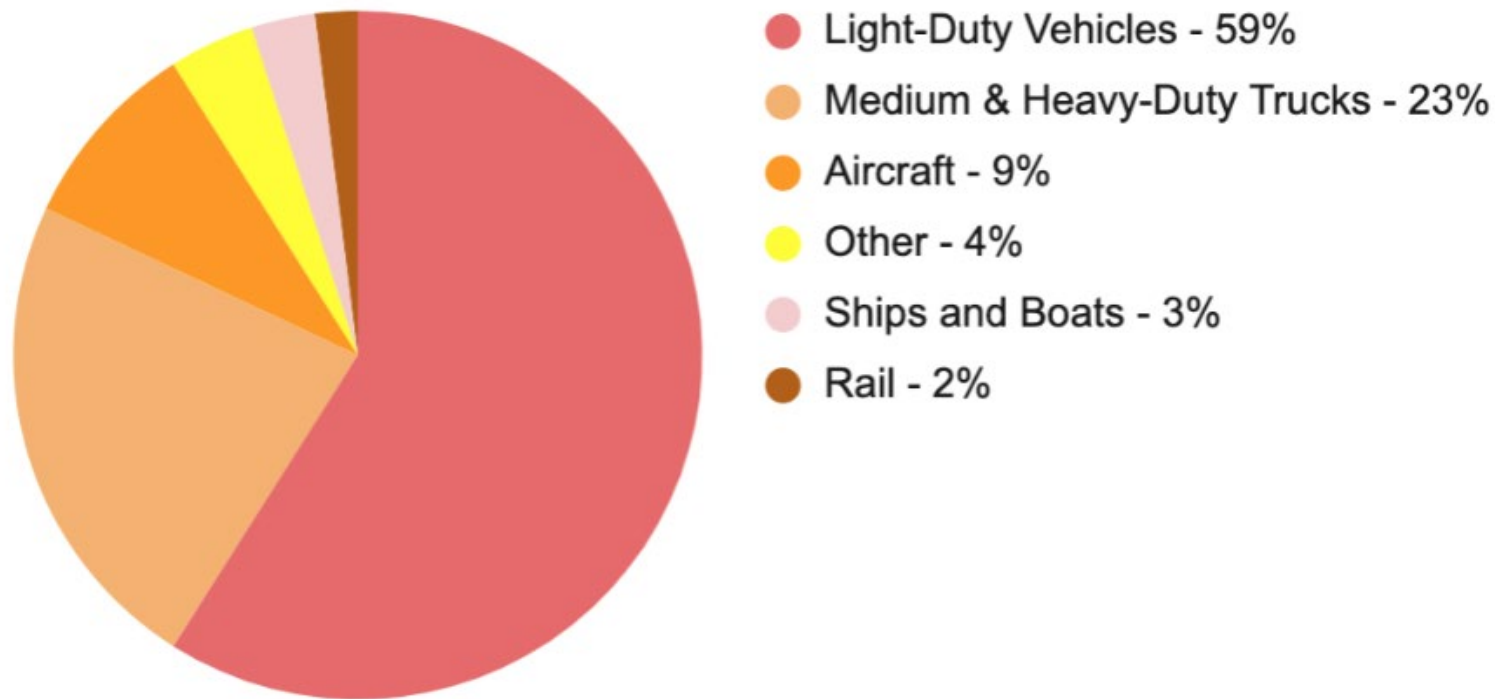


# 2017 U.S. Greenhouse Gas (GHG) Emissions by Sector

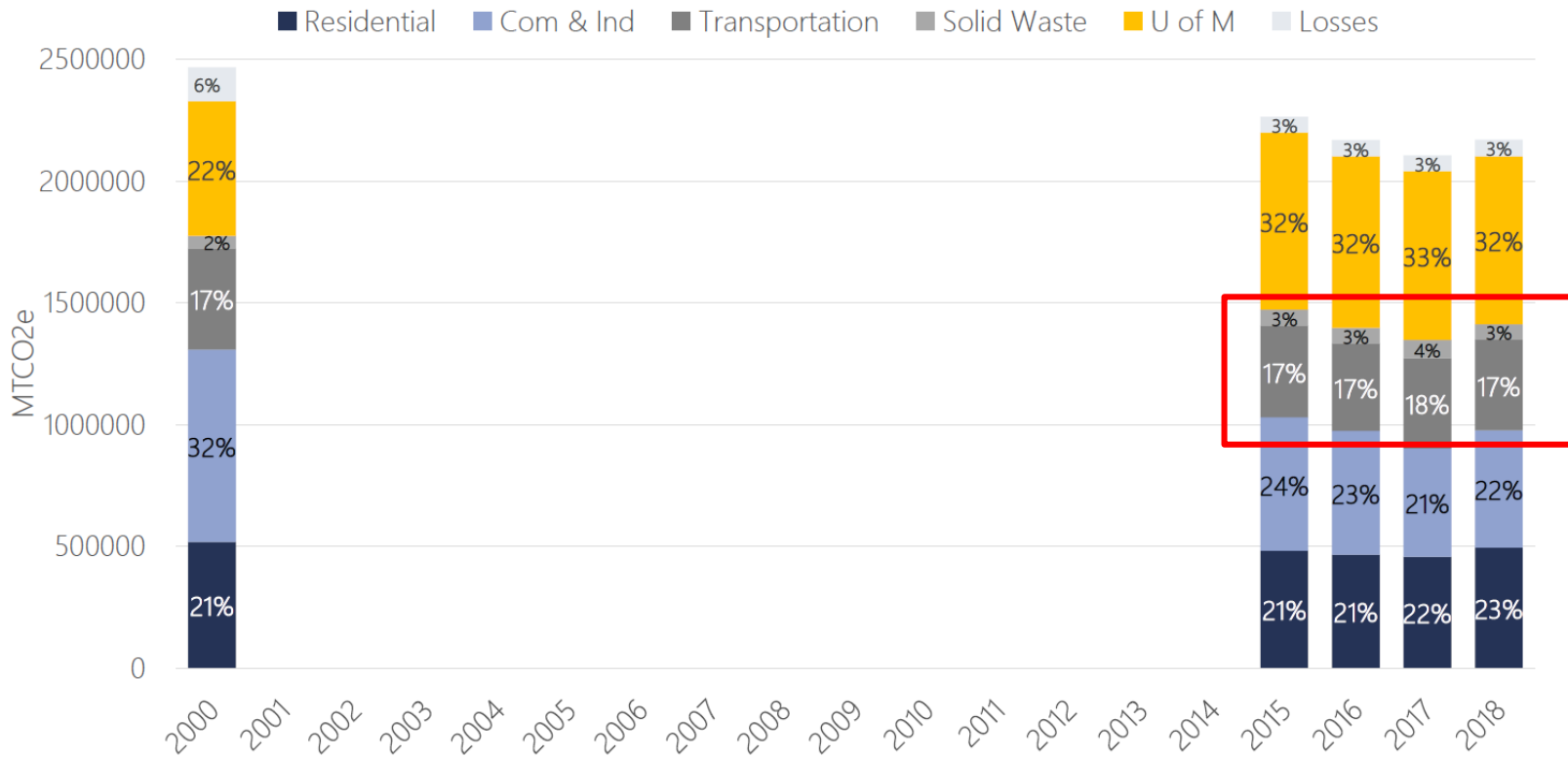


- Transportation - 29%
- Electricity - 28%
- Industry - 22%
- Agriculture - 9%
- Commercial - 6%
- Residential - 5%

# 2017 U.S. Transportation GHG Emissions by Source



# Ann Arbor GHG Emissions by Sector



# Ann Arbor GHG Goals

GHG Targets Adopted in the Ann Arbor Climate Action Plan (2012)

COMMUNITY REDUCTION TARGETS

2015 – 8%

2025 – 25%

2050 – 90%

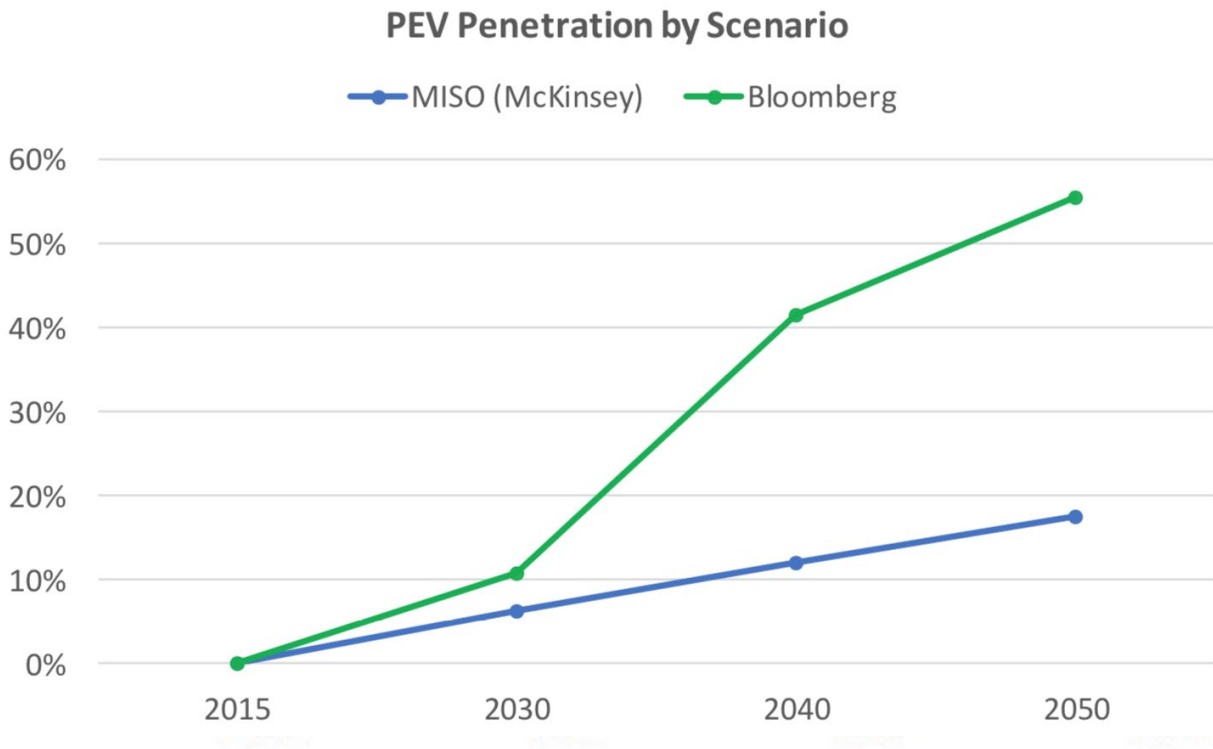
**New target adopted in November 2019: Community-wide Carbon Neutrality by 2030**



# Ann Arbor's Carbon Neutrality Initiative





# Projected EV Growth in Michigan



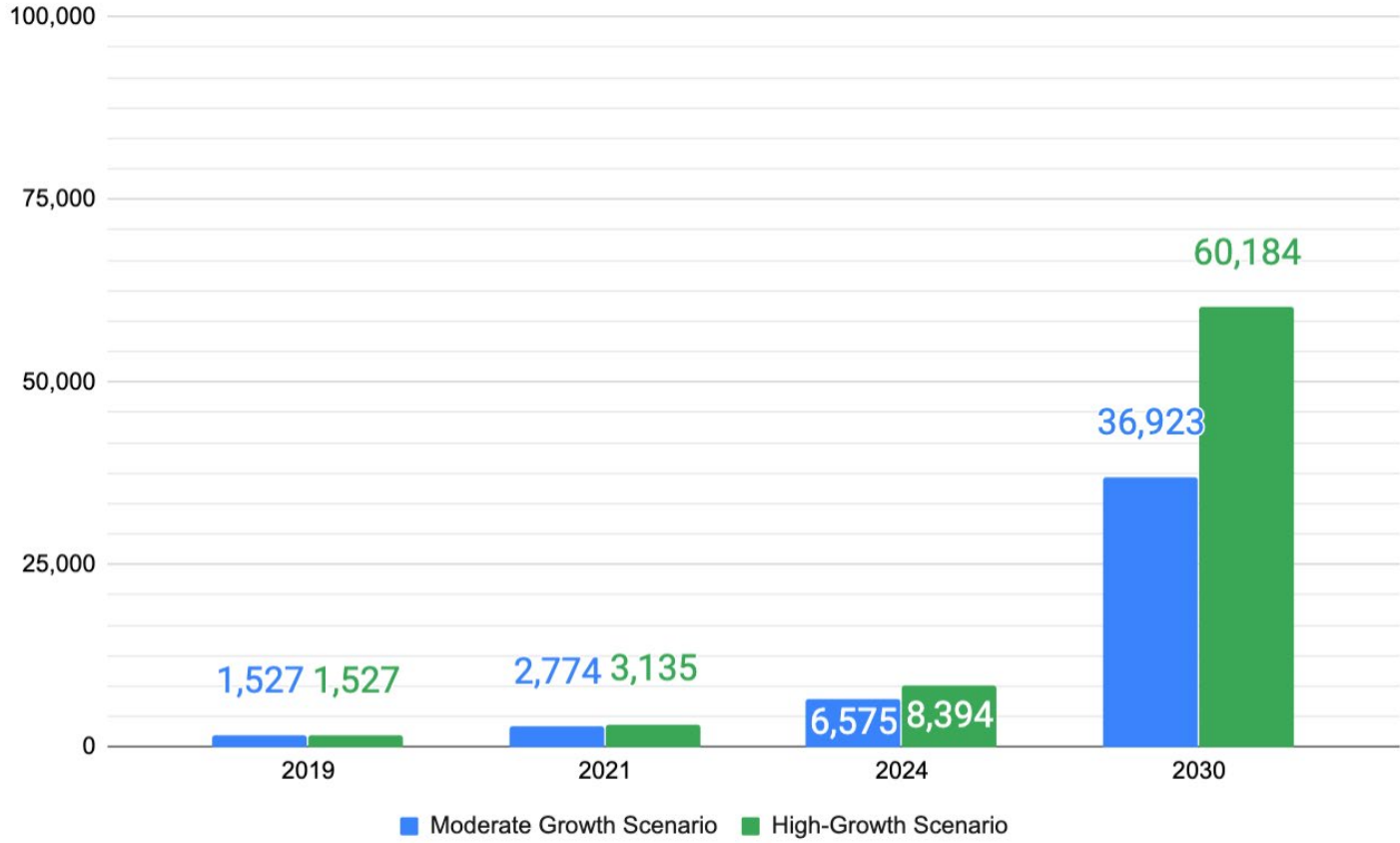
## Electric Vehicle Market Projections

Two sources for MI EV projections:<sup>2</sup>

- MISO scenario: 
  - 2020: 1.49%
  - 2025: 3.74%
  - 2030: 6% → 591,828
- Bloomberg scenario: 
  - 2020: 2.46%
  - 2025: 6.56%
  - 2030: 10.8% → 999,450

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

# Projected EV Growth in the Ann Arbor area



**Total Registered Vehicles (2019): ~300K**

**2019 Ann Arbor EV's: 1,527 or ~0.5%**



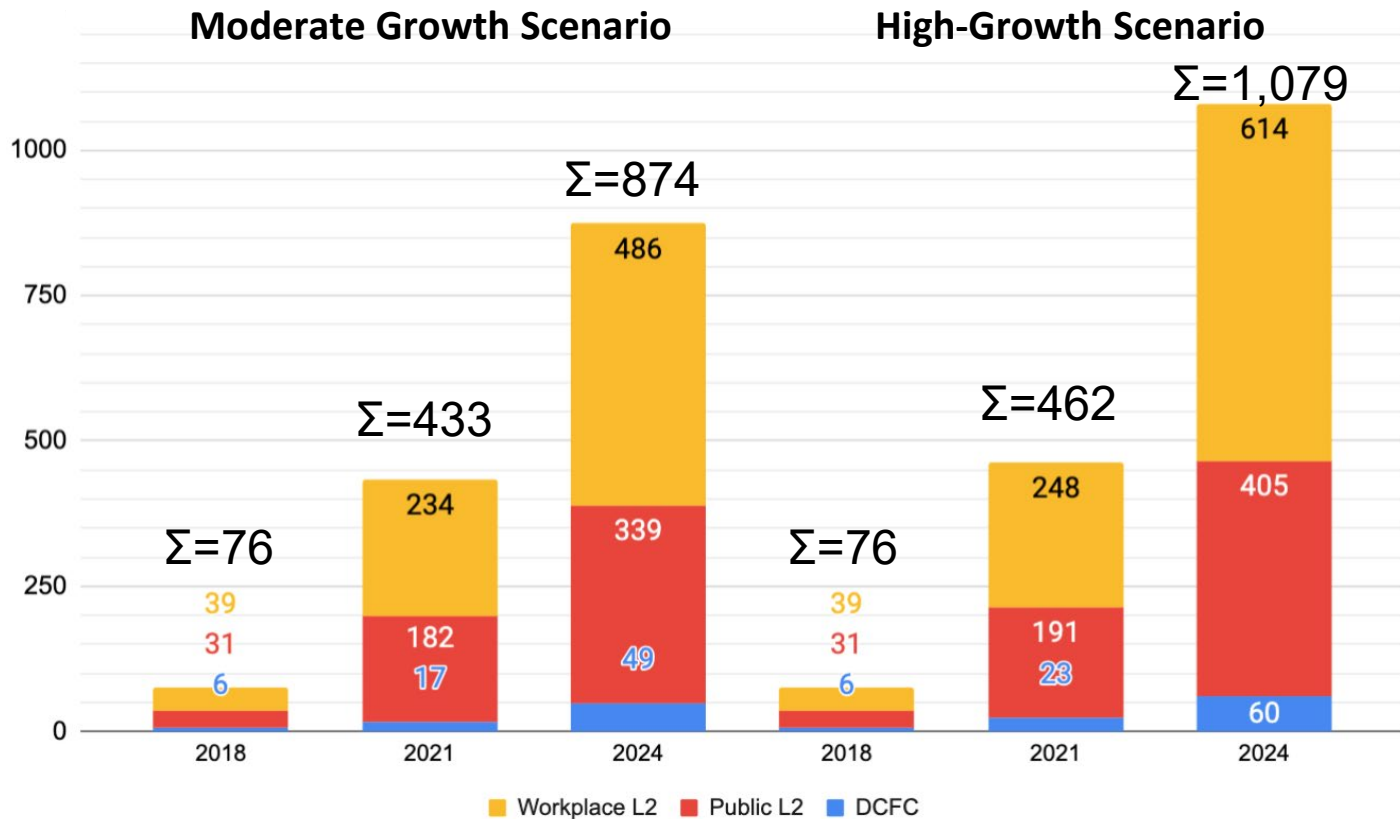
# Projected Need for EV Charging Stations in the Ann Arbor area

area

Current Infrastructure:

L2: 60

DCFC: 14

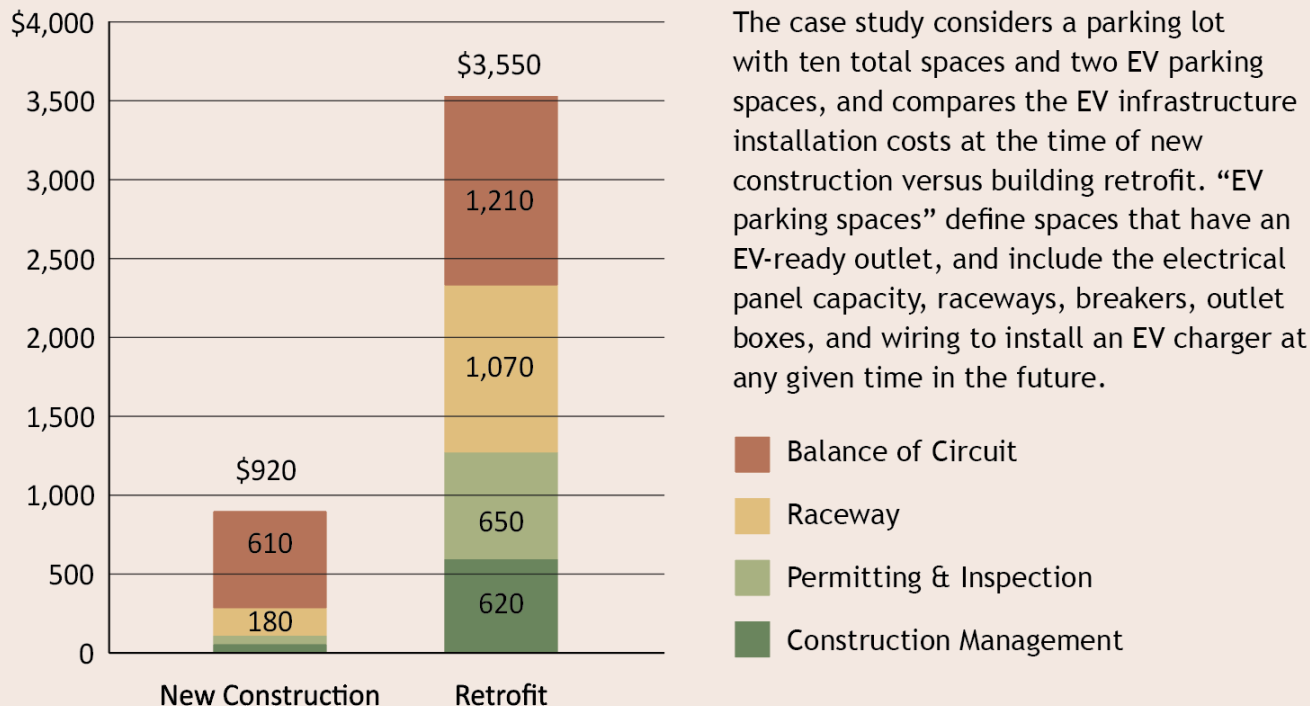


# Electric Vehicle Readiness Ordinance Basics

- Takes the form of a zoning ordinance amending the Ann Arbor Unified Development Code (UDC)
- Intended to prepare the City for expected EV growth and thus charging demand
- Justification is installing conduit and/or wires in *new* construction dramatically cuts costs
- Applies to all projects requiring site plans
- Similar policies adopted by other cities throughout the U.S.
- Mandates a percentage of new parking spaces be either:
  - EV Capable (EV-C); EV Ready (EV-R); EV Installed (EV-I)

## Cost per EV Parking Space: New Construction vs Retrofit

Case Study prepared for the City and County of San Francisco (2016)



The case study considers a parking lot with ten total spaces and two EV parking spaces, and compares the EV infrastructure installation costs at the time of new construction versus building retrofit. “EV parking spaces” define spaces that have an EV-ready outlet, and include the electrical panel capacity, raceways, breakers, outlet boxes, and wiring to install an EV charger at any given time in the future.

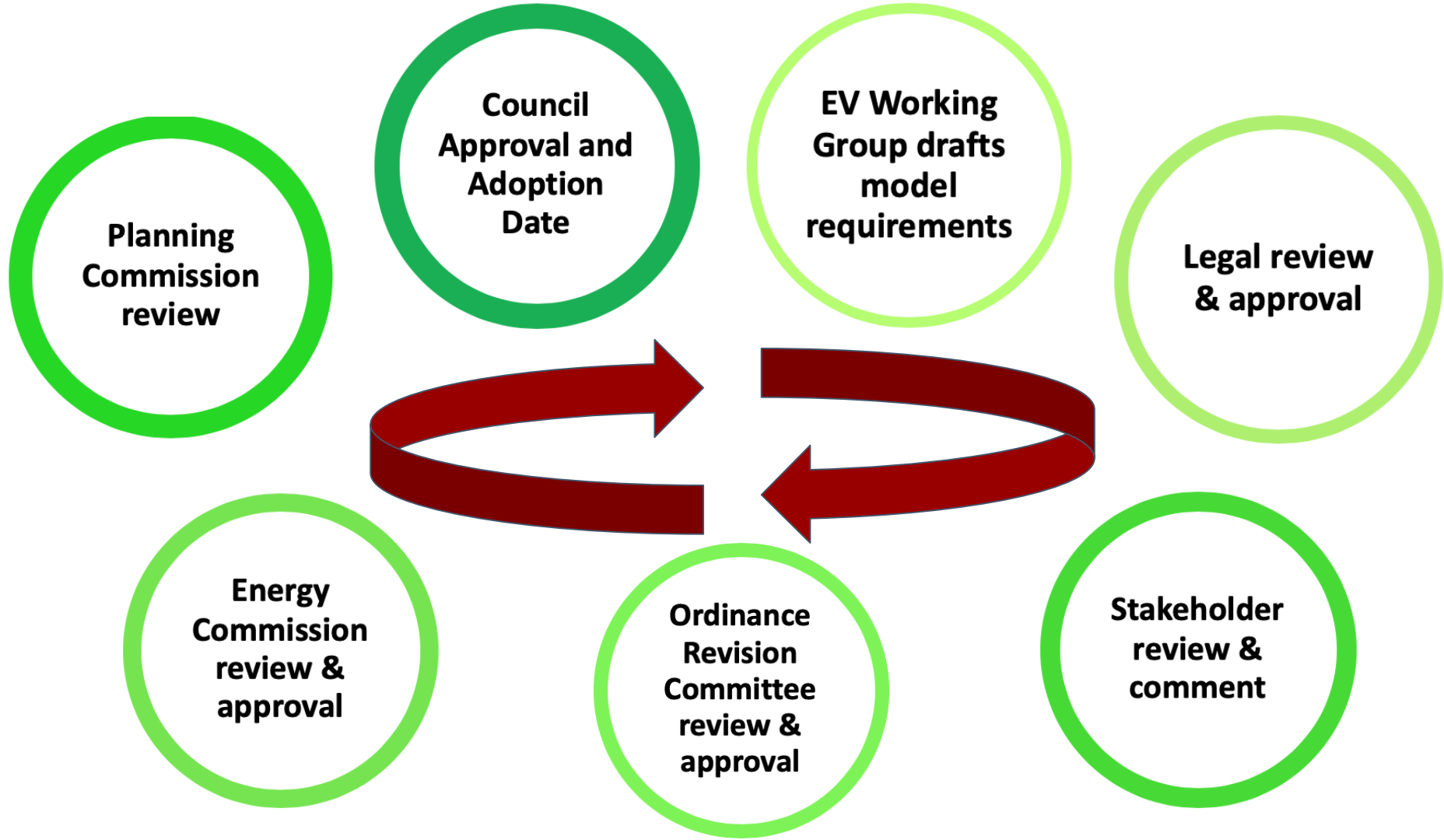
- Balance of Circuit
- Raceway
- Permitting & Inspection
- Construction Management

# Cities Leading the Charge

	Residential	Multifamily		Commercial	
	Spots (EV-Capable or EVSE-Ready)	Spots (EV-Capable or EVSE-Ready)	Chargers Installed (EV_I)	Spots (EV-Capable or EVSE-Ready)	Chargers Installed (EV_I)
<b>Boulder, CO</b>	100%	10% for buildings with 25+ spaces	2 for parking lots with 25+ spaces	10% for buildings with more than 25 spaces	2 for parking lots with 25+ spaces
<b>Denver, CO</b>	100%				1 for city parking lots with 100+ spaces
<b>Lansing, MI</b>	*mixed-use applications require 1 per 50 spaces		1 for each 50 spaces		1 for each parking lot, 1 additional per 50 spaces
<b>Los Angeles, CA</b>	1 per dwelling unit	5% for residences with 17+ dwellings		0-10+, depending on available spaces	0-4+, depending on available space
<b>Palo Alto, CA</b>	1 per dwelling unit	25% of visitor spaces	1 outlet per housing unit	25%	5%
<b>San Francisco, CA</b>	100%	10%		90% EV-Capable, 10% EV-Ready	
<b>Atlanta, GA</b>	1 per dwelling unit	20%		20%	

# Proposed EV Readiness Requirements

Building Type	EV-Capable (EV_C)	EV-Ready (EV_R)	EV-Installed (EV_I)
<b>A - Residential: Single Family and Townhouses</b>		100%	
<b>B - Residential: Multi-family and Student Cooperatives</b>	65%	25%	10%
<b>C - Offices, Parking Structures, Healthcare and Schools</b>	25%	15%	10%
<b>D - Hotels, B&amp;Bs and Other Lodging</b>	25%	50%	25%
<b>E - Recreational, Public, Institutional and Food Service</b>	15%	10%	10%
<b>F - Retail</b>		10%	<b>10%</b>



**EV Working  
Group drafts  
model  
requirements**

**Legal review  
& approval**

**Stakeholder  
review &  
comment**

**Ordinance  
Revision  
Committee  
review &  
approval**

**Energy  
Commission  
review &  
approval**

**Planning  
Commission  
review**

**Council  
Approval and  
Adoption  
Date**

## Ann Arbor UDC Parking Table 5:19-1 Off-Street Parking Spaces Required (draft) EV CHARGING EQUIPMENT REQUIREMENTS

Residential Uses				
Property Use [See Sec. 5.19.3 for Uses in D1 and D2 Downtown Districts:]	Required Parking Spaces	Required Bicycle Spaces	Required Bicycle Class	Required EV Charging Spaces (round up to next integer)
Dwelling, Assisted Living	For R4A: 2 spaces per Dwelling Unit For R4B, R4C, R4D and R4E: 1 ½ spaces per Dwelling Unit For any Nonresidential District: 1 space per Dwelling Unit	1 space per 5 Dwelling Units	A 50% C 50%	65% EV-C plus 25% EV-R 10% EV-I
Dwelling, Multi-Family	For R4A: 2 spaces per Dwelling Unit For R4B, R4C, R4D, and R4E: 1 ½ spaces per Dwelling Unit In any Nonresidential District: 1 space per Dwelling Unit	1 space for 5 Dwelling Units	A 50%, C 50%	65% EV-C plus 25% EV-R 10% EV-I
Dwelling, Single-Family	1 space per Dwelling Unit	None	None	100% EV-R
Dwelling, Townhouse	2 spaces per Dwelling Unit	1 space per 5 Dwelling Units	A 50%, C 50%	100% EV-R
Dwelling, Two Family	1 ½ spaces per Dwelling Unit	None	None	100% EV-R
House Trailer Park	1 space per Dwelling Unit	None	None	100% EV-C
Emergency Shelter	None	None		25% EV-C
Fraternities, sororities, student cooperatives	1 space for each 5 beds	1 space per 2 beds	A 50% B 50%	65% EV-C plus 25% EV-R 10% EV-I
Group Housing	1 space for each 3 beds	1 space per 5 beds	A 50% C 50%	65% EV-C plus 25% EV-R 10% EV-I

# EV Ordinance Site Plan Study:

## Using the Parking Table to Calculate Required EV-C / R / I Parking Spaces

Natural Features Setback		ft	ft	land edge of wetland	NA	NA	NA	ft min.
<b>Vehicular Parking</b>								
Required Parking				PUD	Avon	Thrive		
Multi-family residential	1.5/DU	133 dwelling units + 195	204	71(1 EV)	133(38 EV)(2 BF)		min	
Single Family	2/DU	16 dwelling units + 32	32	-	32(8 EV)		min	
Retail sales, general merchandise less than 100,000/sf	1/100sf	4764/100sf min. = 15 spaces	15	-	15(6 EV)(2BF)		min	
School, Private (Elementary/Day Care)	3/classroom	3 classrooms, max 54 students	0	church agreement			min	
		Total Spaces Required = 251	251	71	180			
<b>Bicycle Parking</b>								
				PUD	Avon	Thrive		



### PARKING REQUIREMENTS

PARKING SPACE TYPES	REQUIRED	PREVIOUS PLAN	PROPOSED	LOCATION
<b>VEHICULAR SPACES</b>				
1 CAR GARAGES		56	203*	INTERIOR
2 CAR GARAGES		152/304 SPACES	51/102 SPACES	INTERIOR
EXTERIOR PARKING				EXTERIOR
9' SPACES	264	60	60	
8' SPACES	115 MAX	74	74	
BF SPACES	4	5	5	
BF-VAN SPACES	1	1	1	
<b>TOTAL VEHICULAR SPACES</b>	380	600 SPACES	445 SPACES	
	1.5 SP/UNIT	1.95 SP/UNIT	1.78 SP/UNIT	
<b>BICYCLE SPACES</b>				
CLASS A	26/50%	208	154	IN GARAGES
CLASS B	25/50%	60	60	EXTERIOR
<b>TOTAL BICYCLE SPACES</b>	51 SPACES	268 SPACES	214 SPACES	
	1 SP/5 DU	1 SP/0.96 DU	1 SP/1.18 DU	

\* 4 apartment units have 1 stall barrier free garages

TOTAL SPACES	AVON	THRIVE	
<b>Parking</b>			
Parking - Automobiles - total	705	719	1.5 per unit required
Garage Parking (see architectural plans)		578	
Garage Parking (see architectural plans)		14	EV charging stations
Townhouse garage parking		49	
Street Parking		92	Includes 2 car share spaces
Barrier Free Parking		16	Included in total (4 s/he, 12 garage)
Parking - Bicycles (see architectural plans)	94		1 per 5 D U.
Parking - in garages	47	128	Class A & A1 (50%)
Parking - in garages	47	40	Class B (50%)
Parking - in garages	47	38	Class C
Parking - surface		9	Class C

Stories	non-residential: LUD	non-residential: LUD	non-residential: LUD
	n/a	n/a	n/a
<b>PARKING - Vehicular</b>	Per Off Street Parking Table 5-19 (City of Ann Arbor Unified Development Code)	0	Per July 1, 2019 Council Amended Supplemental Regulations
			490 (Incl. 7 standard and 2 van BF Spaces)
<b>PARKING - Bicycle</b>	Per Off Street Parking Table 5-19 (City of Ann Arbor Unified Development Code)	0	Per July 1, 2019 Council Amended Supplemental Regulations
			82 Required, 83 Provided, as shown on CS100



# Added EV Charging Capacity

Total EV charging capacity that Ann Arbor would have added had the ordinance been in place based on the twenty-seven 2019 site plans and the proposed UDC Parking Table's EV Charging Equipment Requirements:

- EV-C spaces: 1,257
- EV-R spaces: 1,180
- EV-I spaces: 362

# Initial Feedback

- Good support from Energy and Planning Commission's Ordinance Revision Committee and within City Administration
  - A few requirements have been changed based on input from the Ordinance Review Committee
  - One commissioner would like ordinance to mandate chargers be powered by renewable energy

# Initial Feedback, cont.

- Feedback from developers:
  - Generally prefer a carrot instead of a stick approach
  - Widespread concern that the City will be mandating an additional service with costs, not just for chargers and building infrastructure but also potentially for DTE infrastructure upgrades
    - Existing DTE incentives will run out
    - This will negatively impact affordability, for both developers and customers / tenants, as there are no offsetting savings or incentives
    - Possible consequence is less development
  - Tax credits desired to offset (infrastructure) costs
  - Clarification / explanation required as to what constitutes “major renovation” and thus what triggers the ordinance in such cases

# Initial Feedback, cont.

- Feedback from DTE:
  - Doing a review of potential electrical capacity costs, as part of UM project (Dr. Sarah Mills)
  - Have had a meeting to discuss implications of the ordinance
  - In general, advance communications with DTE about electrical needs key for their planning process

# Questions ?



**Ann Arbor's Draft Electric Vehicle Readiness Ordinance**

# HOW TO CALCULATE NUMBER OF EV-C/R/I PARKING SPACES

EXAMPLE: Midtown Condominium, 1400 S. Maple, just south of Pauline Blvd, pt. 1

EXERPT FROM UDC PARKING TABLE:

Property Uses	Off-Street Parking Spaces Required	EV Charging Spaces Required
Dwelling, Single-Family	1 space per Dwelling Unit	100% EV-R
Dwelling, Townhouse	2 spaces per Dwelling Unit	100% EV-R

Calculating Number of EV-C / R / I Parking Spaces:

PROJECT ID:	SP19-011 Midtown Condos, 1400 S. Maple St.					
ZONE:	R4B Multiple family dwelling					
79 townhomes; 174 apartments	Units	parking spaces	EV-C	EV-R	EV-I	
TOTAL RESIDENTIAL UNITS:	253					
TOTAL PROPOSED SPACES:		445				
one-car garages	203	203	0%	100%	203	0%
two-car garages	51	102	0%	100%	51	0%
exterior parking spaces		140	0%	0%	-	0%
		445	0	254		0

# HOW TO CALCULATE NUMBER OF EV-C/R/I PARKING SPACES

EXAMPLE: Midtown Condominium, 1400 S. Maple, pt. 2

PARKING TABLE IN SITE PLAN:

PARKING SPACE TYPES		REQUIRED	PREVIOUS PLAN	PROPOSED	LOCATION
VEHICULAR SPACES					
1 CAR GARAGES			56	203*	INTERIOR
2 CAR GARAGES			152/304 SPACES	51/102 SPACES	INTERIOR
EXTERIOR PARKING	9' SPACES	264	60	60	EXTERIOR
	8' SPACES	115	74	74	
	BF SPACES	4	5	5	
	BF VAN SPACES	1	1	1	
TOTAL VEHICULAR SPACES		380	600 SPACES	445 SPACES	
		1.5 SP/UNIT	1.95 SP/UNIT	1.76 SP/UNIT	

NEW PARKING TABLE:

PARKING SPACE TYPES		REQUIRED	PREVIOUS PLAN	PROPOSED	# EV-C/R/R SPACES	LOCATION
VEHICULAR SPACES						
1 CAR GARAGES			56	203*	203 EV-R	INTERIOR
2 CAR GARAGES			152/304 SPACES	51/102 SPACES	51 EV-R	INTERIOR
EXTERIOR PARKING	9' SPACES	264	60	60		EXTERIOR
	8' SPACES	115	74	74		
	BF SPACES	4	5	5		
	BF VAN SPACES	1	1	1		
TOTAL VEHICULAR SPACES		380	600 SPACES	445 SPACES		
		1.5 SP/UNIT	1.95 SP/UNIT	1.76 SP/UNIT		





# HOW TO CALCULATE NUMBER OF EV-C/R/I PARKING SPACES

## EXAMPLE: The Glen PUD, pt. 2

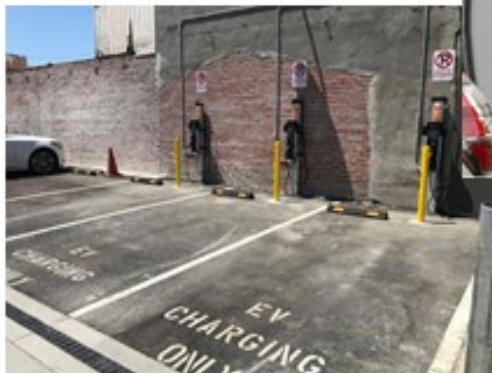
### PARKING TABLE IN SITE PLAN:

	Glenn Ann Place Previously Approved PUD Zoning 11/01/07	The Glenn Mixed Use Development Previously Approved PUD Zoning - December 2017	The Glenn Mixed Use Development Required/Provided	The Glenn Mixed Use Development Revised PUD Zoning - Current Provided
<b>CAR PARKING</b>				
Retail Parking Req'd	16,800 SF/310 = 54 spaces		1,173 SF/310 = 4 spaces	
Office Parking Req'd	21,051 SF/353 = 60 spaces			
Apartment Parking Req'd	112 Units/1 = 112 spaces		24 Units/1 = 24 spaces	
Hotel Parking Req'd			162 Hotel Rooms/1 = 162 spaces	
Restaurant Parking Req'd			4,000 SF/100 = 40 spaces Angelo's restaurant parking = 8 spaces	
<b>Total Parking Req'd</b>	<b>237 spaces required</b>		<b>238 total spaces required</b>	
<b>Total Parking Provided</b>	<b>136 + 8 = 144 spaces provided</b>	<b>252 spaces provided</b>		<b>241 spaces provided per parking summary on A6</b>

### NEW PARKING TABLE:

Retail: 1,173 SF/310 = 4 spaces (0.4 EV-R spaces; 0.4 EV-I spaces)
Apartment: 24 Units/1 = 24 spaces (16 EV-C spaces; 6 EV-R spaces; 2 EV-I spaces)
Hotel: 162 Hotel Rooms/1 = 162 spaces (40 EV-C spaces; 81 EV-R spaces; 41 EV-I spaces)
Restaurant: 4,000 SF/100 = 40 spaces (6 EV-C spaces; 4 EV-R spaces; 4 EV-I spaces)
Angelo's restaurant parking = 8 spaces (2 EV-C)
<b>238 total spaces required</b>

## WALL- AND POLE-MOUNTED L2 CHARGING STATIONS



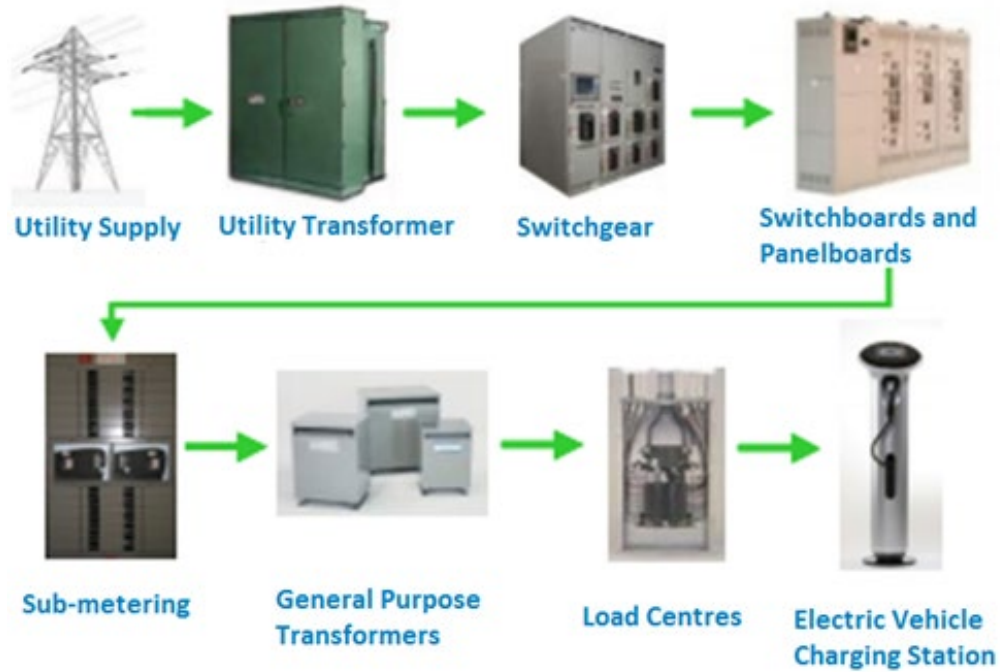
# Ann Arbor Installations



# PLUG-IN AND PORTABLE L2 CHARGERS



# EV CHARGING STATION FLOW CHART



- <http://www.eai.in/wp-content/uploads/2018/12/EVSE.png>