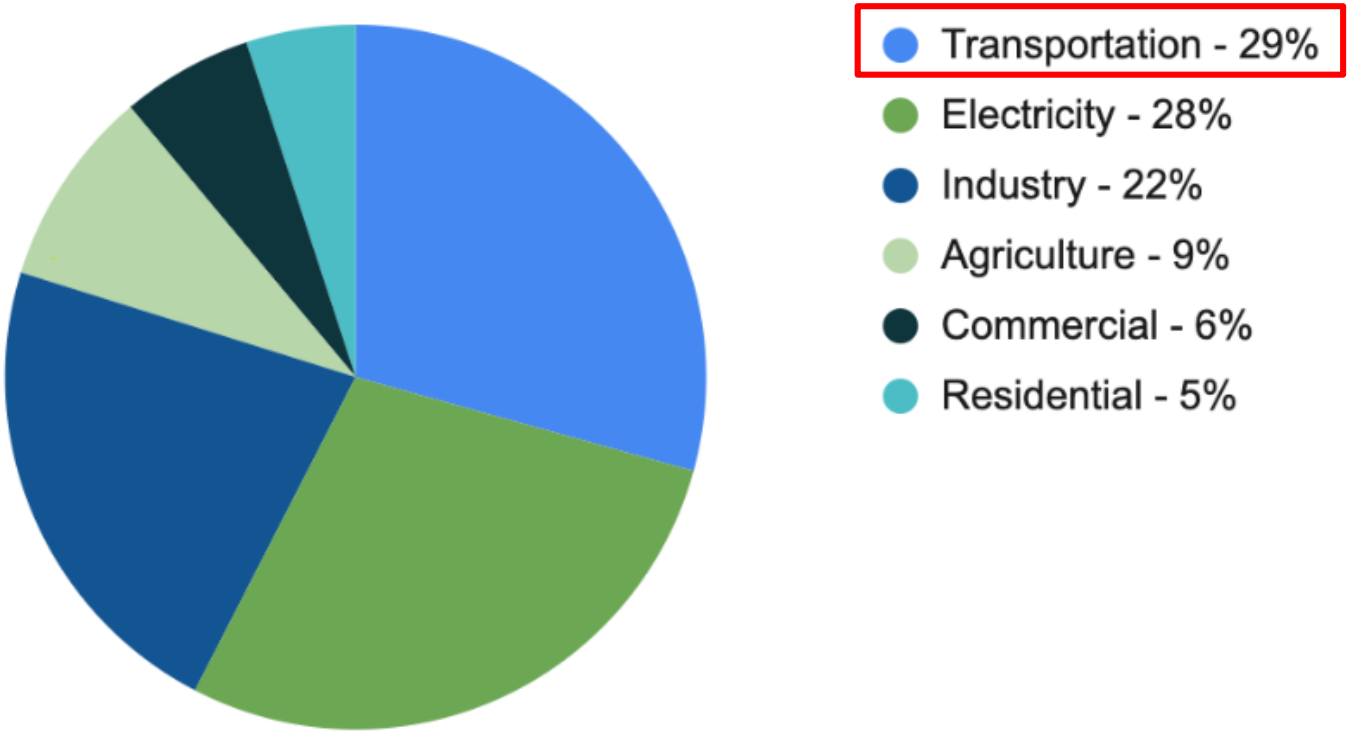
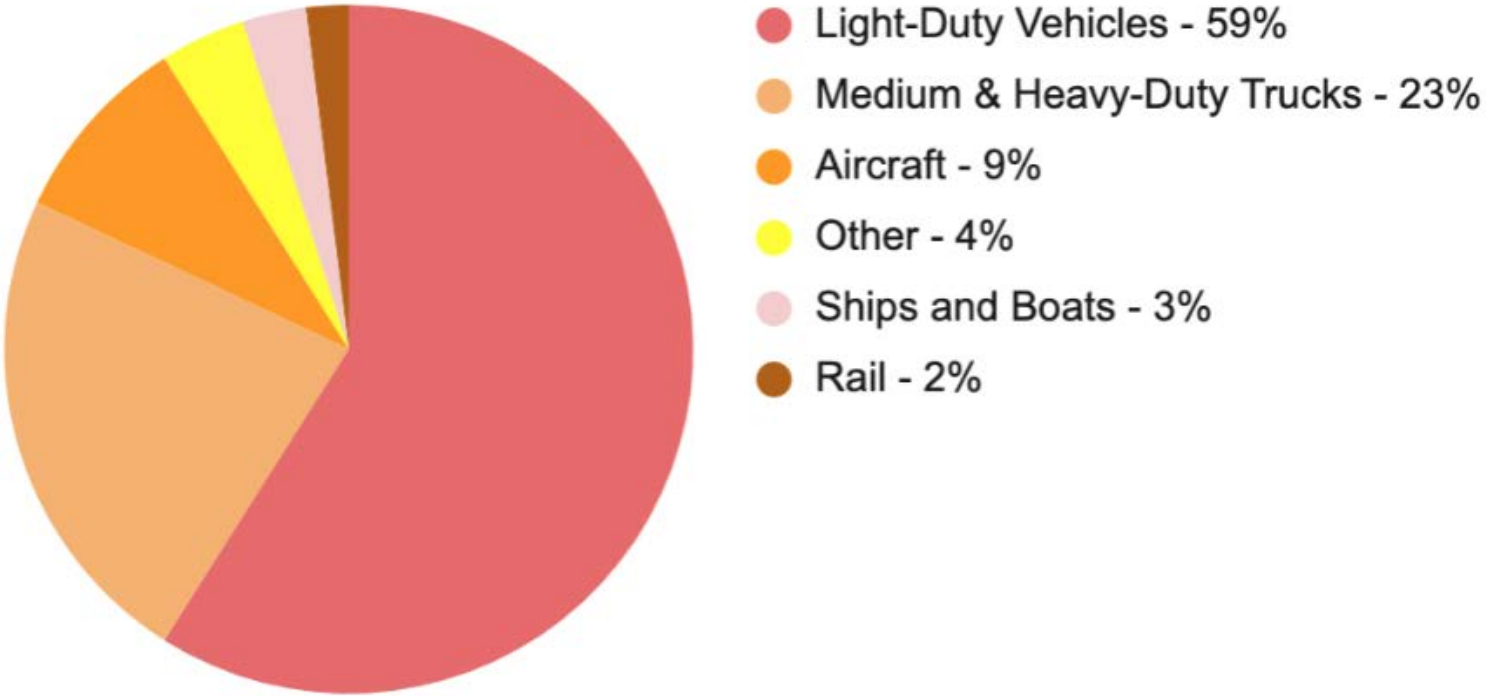
Ann Arbor's Draft Electric Vehicle Readiness Ordinance

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



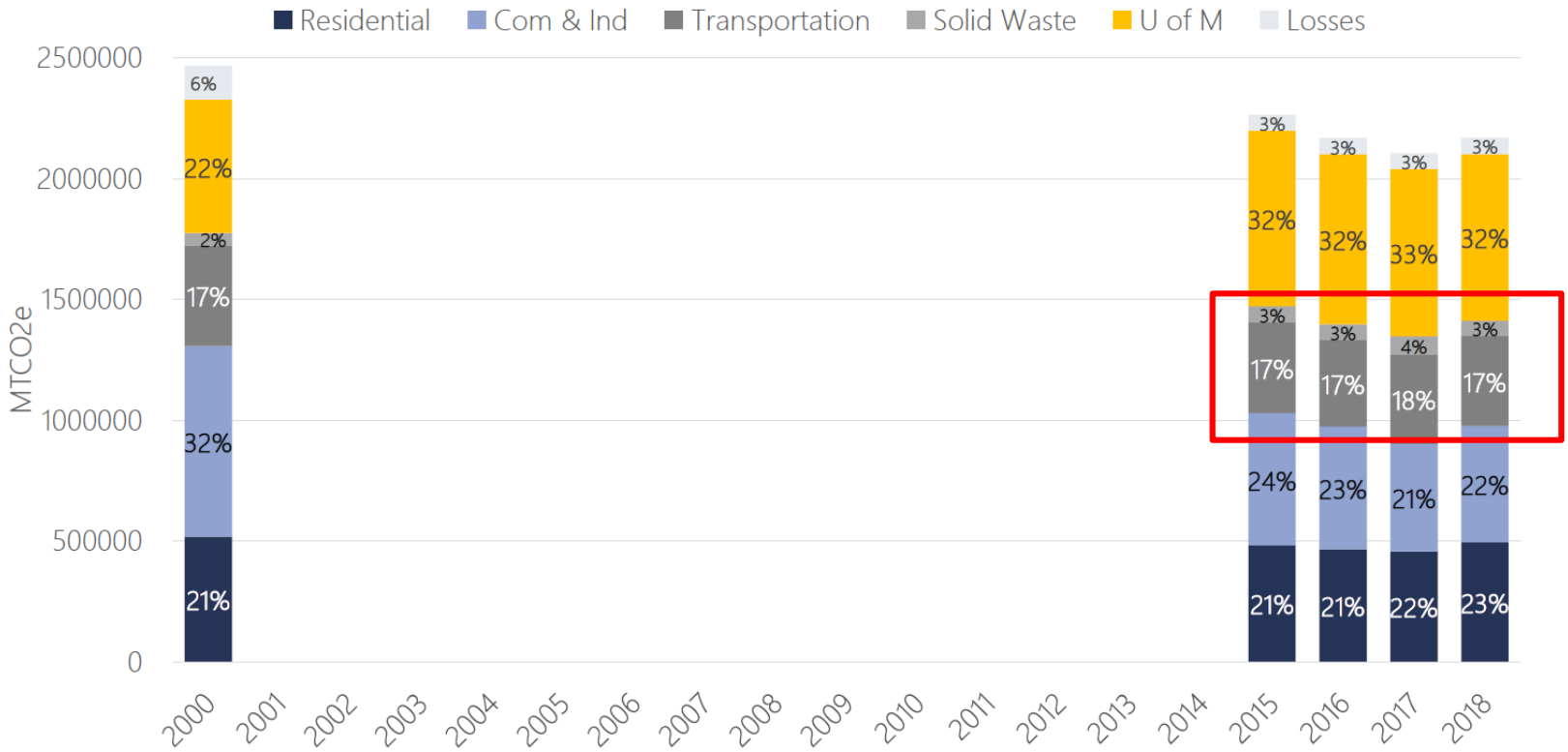
www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

2017 U.S. Transportation GHG Emissions by Source



www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

Ann Arbor GHG Emissions by Sector



Ann Arbor GHG Goals

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

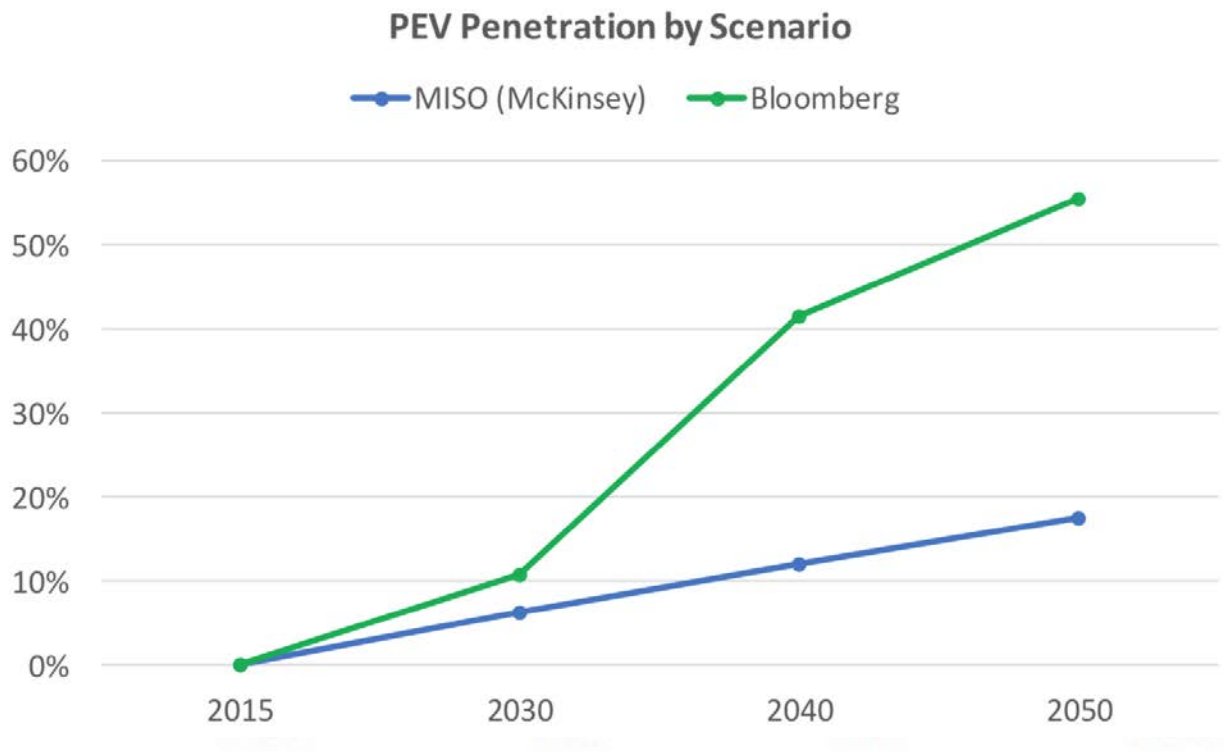
COMMUNITY REDUCTION TARGETS

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:[2]

- 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

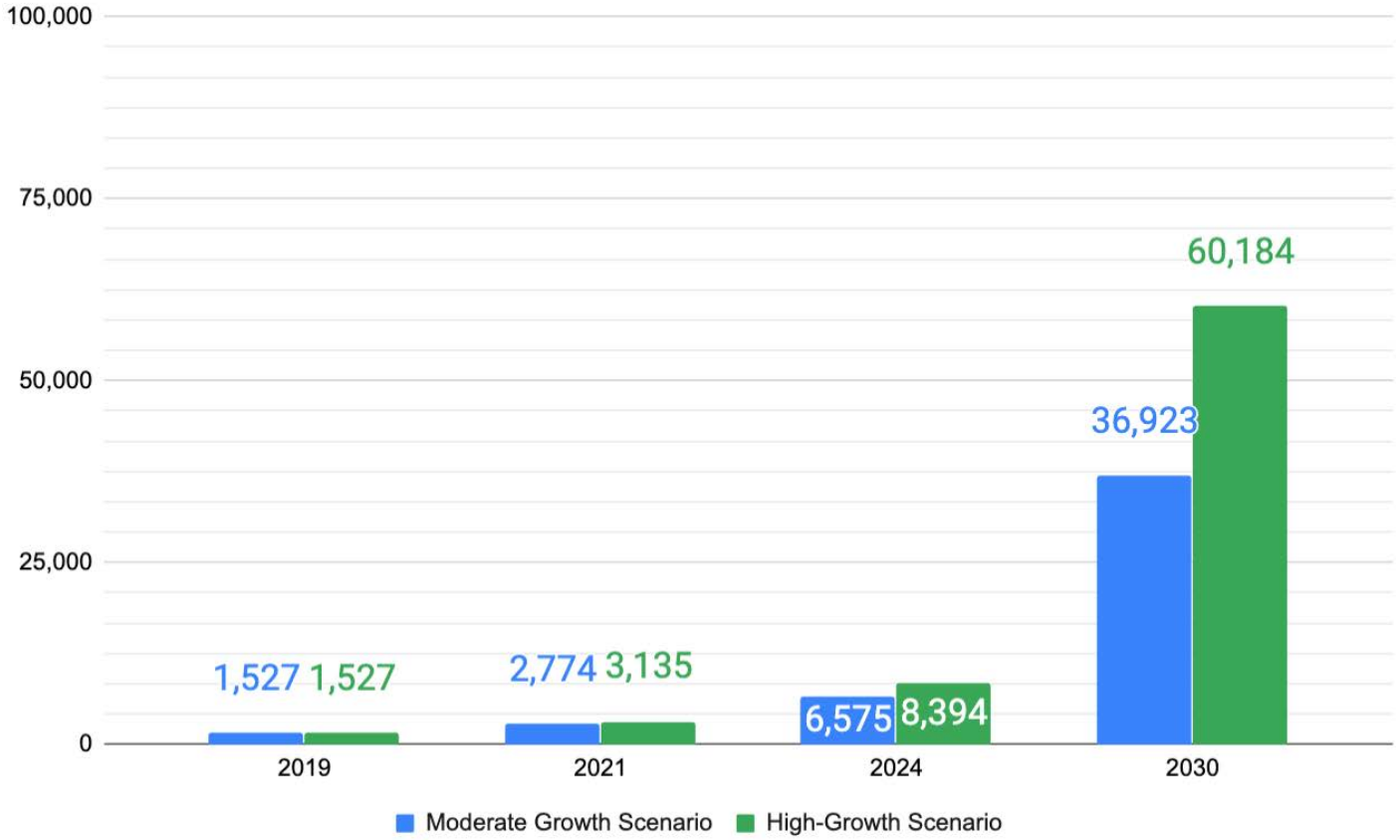
where EV market share is the proportion of EVs to all vehicles on the road.

Source: MJ

Projected EV Growth in the Ann Arbor area

Total Registered Vehicles (2019): ~300K

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



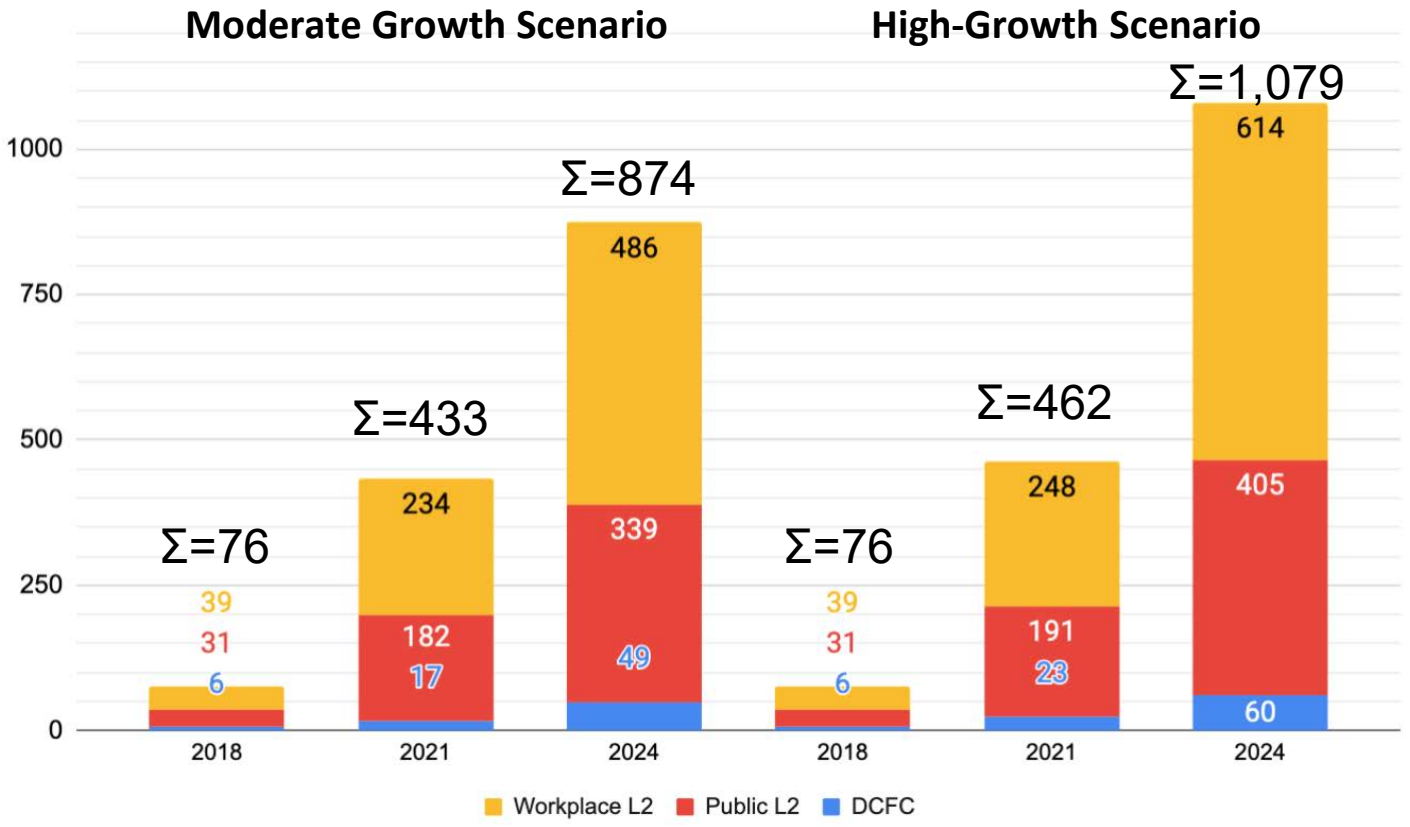
Source: Analysis based on MJ Bradley report for MI, Aug. 2018.

Projected Need for EV Charging Stations in the Ann Arbor area

Current Infrastructure:

L2: 60

DCFC: 14



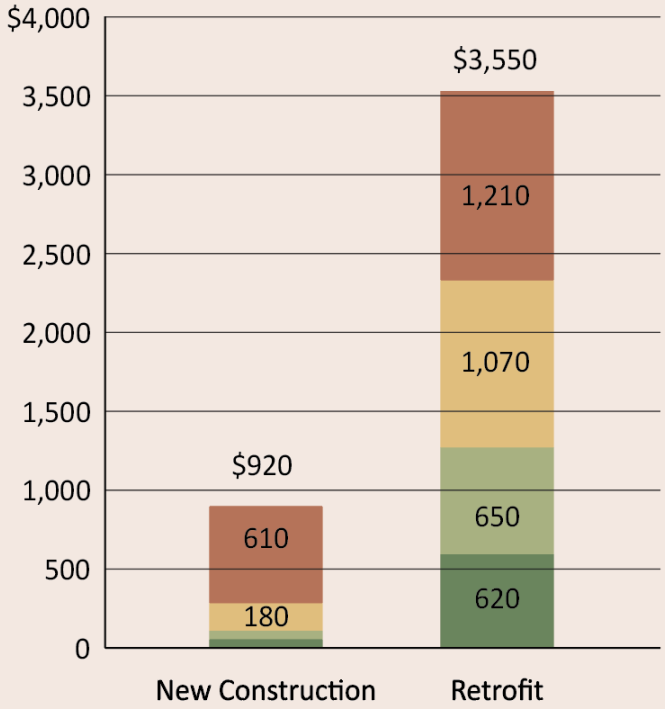
Tim Arvan, Charles Griffith. "Forecasting Demand for EV Charging Infrastructure in Ann Arbor," Aug. 2018.

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

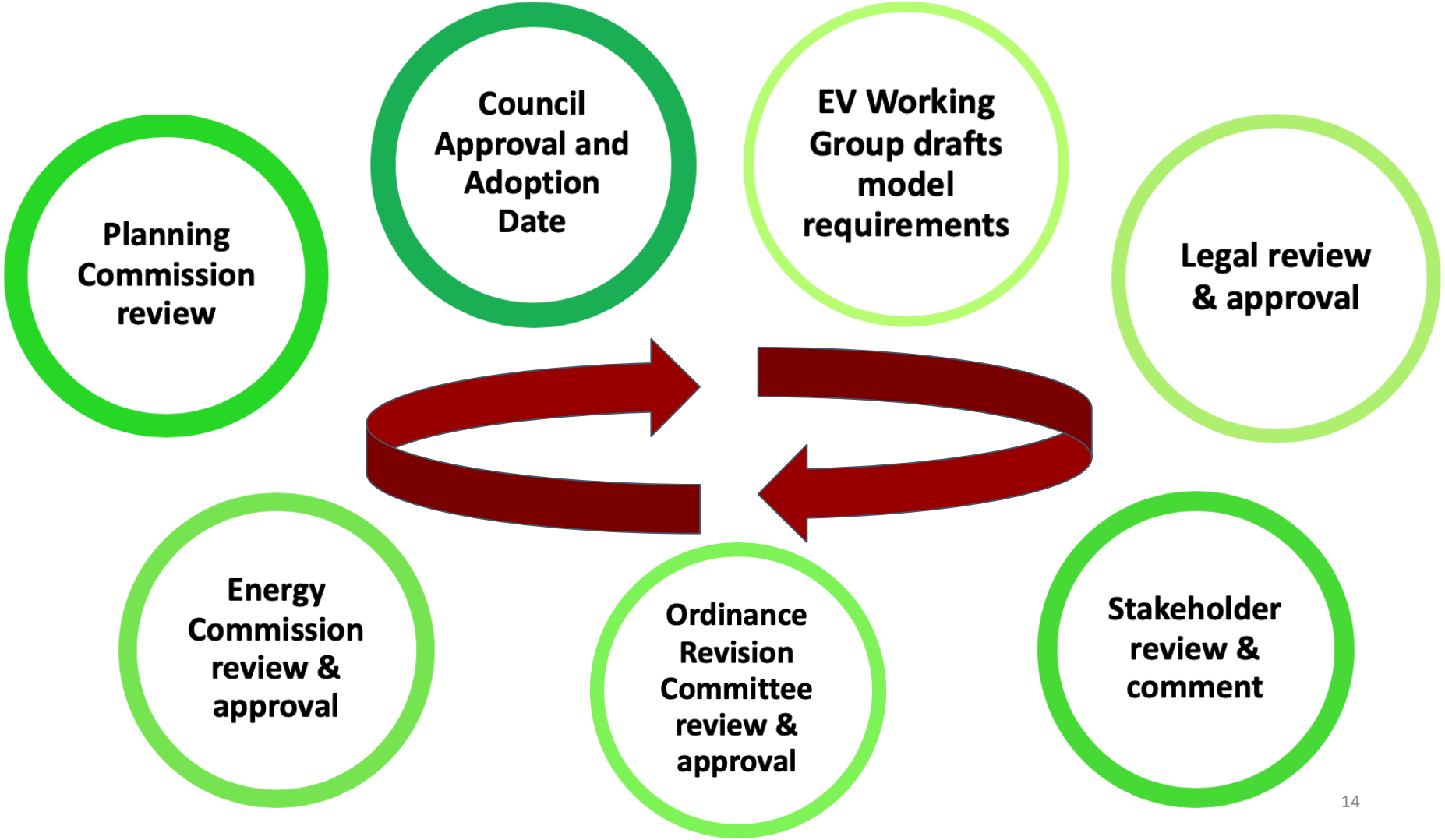
www.swenergy.org/cracking-the-code-on-ev-ready-building-codes

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

Proposed EV Readiness Requirements

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


Council Approval and Adoption Date
EV Working Group drafts model requirements
Planning Commission review
Legal review & approval
Energy Commission review & approval
Ordinance Revision Committee review & approval
Stakeholder review & comment

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%, C50%	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%	65% EV-C plus 25% EV-R

EV Ordinance Site Plan Study:

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

Natural Features Setback		ft		and edge of wetland	NA	NA	NA	ft min.
Vehicular Parking								
					PUD	Avalon	Thrive	
Required Parking								
	Multi-family residential		1.5 /DU	133 dwelling units= 195	204	71(1 EV)	133(58 EV)(2 BF)	min
	Single Family		2 /DU	16 dwelling units = 32	32	-	32(16 EV)	min
	Retail sales, general merchandise less than 300,000sf		1 /310sf	4749/310sf min. = 15 spaces	15	-	15(6 EV) (2BF)	min
	School, Private (Elementary/Day Care)	3 classrooms, max 54 students	1/classroom	3 classrooms x 3 = 9 spaces	0		church agreement	
				Total Spaces Required = 251	251	71	180	min
Bicycle Parking								
					PUD	Avalon	Thrive	

Parking			
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 site, 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

PARKING REQUIREMENTS

PARKING SPACE TYPES		REQUIRED	PREVIOUS PLAN	PROPOSED	LOCATION
VEHICULAR SPACES					
1 CAR GARAGES			58	203*	INTERIOR
2 CAR GARAGES			152/304 SPACES	51/102 SPACES	INTERIOR
EXTERIOR PARKING	9' SPACES	264	60	60	EXTERIOR
	8' SPACES	115 MAX.	74	74	
	BF SPACES	4	5	5	
	BF VAN SPACES	1	1	1	
TOTAL VEHICULAR SPACES		380 1.5 SP/UNIT	600 SPACES 1.95 SP/UNIT	445 SPACES 1.76 SP/UNIT	
BICYCLE SPACES					
	CLASS A	26/50%	208	154	IN GARAGES
	CLASS B	25/50%	60	60	EXTERIOR
TOTAL BICYCLE SPACES		51 SPACES 1 SP/5 DU	268 SPACES 1 SP/0.96 DU	214 SPACES 1 SP/1.18 DU	

* 4 apartment units have 1 stall barrier free garages

Height			Non-residential 105	Non-res... 105
Stories	n/a	n/a	n/a	n/a
PARKING - Vehicular	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)
PARKING - Bicycle	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 C5100

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 ?

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%	0	100%	203	0%	0	
two-car garages	51	102	0%	0	100%	51	0%	0	
exterior parking spaces		140	0%	0	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	PROPPOSED	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 1.5 SP/UNIT	600 SPACES 1.95 SP/UNIT	445 SPACES 1.76 SP/UNIT	

NEW PARKING TABLE:

PARKING SPACE TYPES		REQUIRED	PREVIOUS PLAN	PROPPOSED	# EV-C/I/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 1.5 SP/UNIT	600 SPACES 1.95 SP/UNIT	445 SPACES 1.76 SP/UNIT		

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

EXAMPLE: The Glen PUD, between E. Ann & Catherine, pt. 1

EXERPT FROM UDC PARKING TABLE:

Property Uses	Off-Street Parking Spaces Required	EV Charging Spaces Required
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	65% EV-C plus 25% EV-R plus 10% EV-I
Hotel	1 space per room	25% EV-C plus 50% EV-R plus 25% EV-I
Retail Sales, General Merchandise	Retail stores and Retail Centers less than 300,000 sq. ft. of Floor Area = Minimum of 1 space per 310 sq. ft. of Floor Area; maximum of 1 space per 265 sq. ft. of Floor Area [1]	10% EV-R plus 10% EV-I
Restaurant, Bar, Food Service	1 space for each 100 sq. ft. of Floor Area	15% EV-C plus 10% EV-R plus 10% EV-I

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

PROJECT ID:	SP19-012								
ZONE:	T2S, R6EMixed use								
Hotel + Retail + Apartments + Restaurant 24 apts, 162 hotel rooms	Units	area (sf)	parking spaces	EV-C		EV-R		EV-I	
TOTAL REQUIRED SPACES:			238						
TOTAL PROPOSED SPACES:			241						
apartment units	24		24	65%	16	25%	6	10%	2
hotel rooms	162		162	25%	40.5	50%	121.5	25%	40.5
retail		1173 sf	4	0%	0	10%	0.4	10%	0.4
restaurant (new)		4000 sf	40	15%	6	10%	4	10%	4
restaurant (Angelos)			8	15%	1	10%	1	10%	1
			238		63		92		48

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 11/01/7	The Glenn Mixed Use Development Previously Approved PUD Zoning - December 2017	The Glenn Mixed Use Development Required/Permitted	The Glenn Mixed Use Development Revised PUD Zoning - Current Provided
CAR PARKING				
Retail Parking Reqd	16,800 SF/310 = 54 spaces		1,173 SF/310 = 4 spaces	
Office Parking Reqd	21,051 SF/333 = 65 spaces			
Apartment Parking Reqd	112 Units/1 = 112 spaces		24 Units/1 = 24 spaces	
Hotel Parking Reqd			162 Hotel Rooms/1 = 162 spaces	
Restaurant Parking Reqd			4,000 SF/100 = 40spaces	
			Angelo's restaurant parking = 8 spaces	
Total Parking Reqd	237 spaces required		238 total spaces required	
Total Parking Provided	136 + 8 = 144 spaces provided	252 spaces provided		241 spaces provided per parking summary on A6

NEW PARKING TABLE:

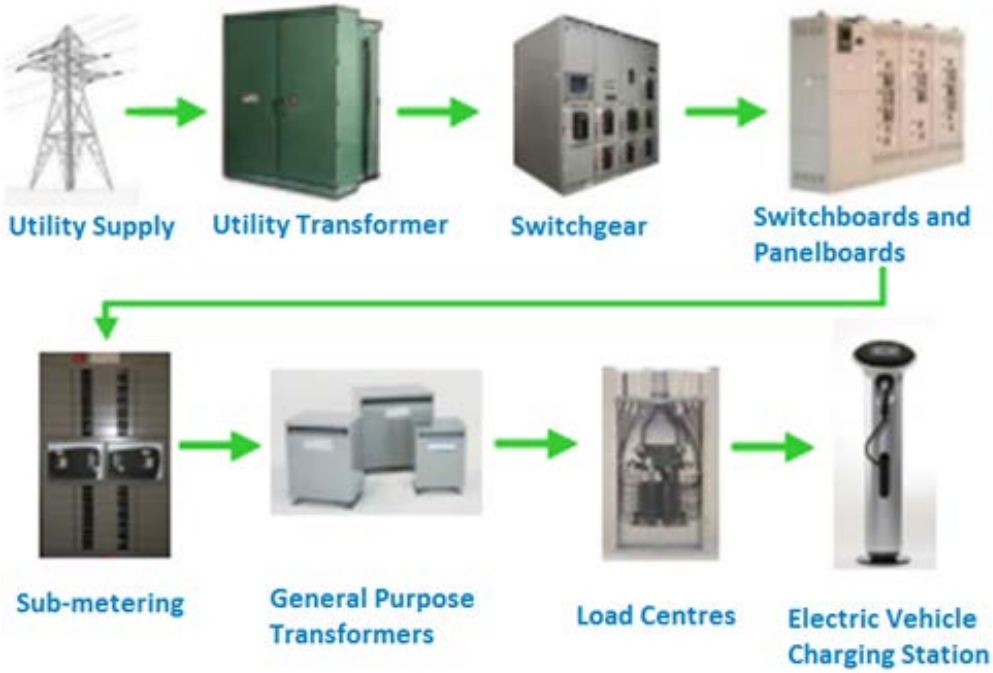
Retail: 1,173 SF/310 = 4 spaces (0.4 EV-R spaces; 0.4 EV-I spaces)
Apartments: 24 Units/1 = 24 spaces (16 EV-C spaces; 6 EV-R spaces; 2 EV-I spaces)
162 Hotel Rooms/1 = 162 spaces (40 EV-C spaces; 81 EV-R spaces; 41 EV-I spaces)
Restaurant: 4,000 SF/100 = 40 spaces (6 EV-C spaces; 4 EV-R spaces; 4 EV-I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

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