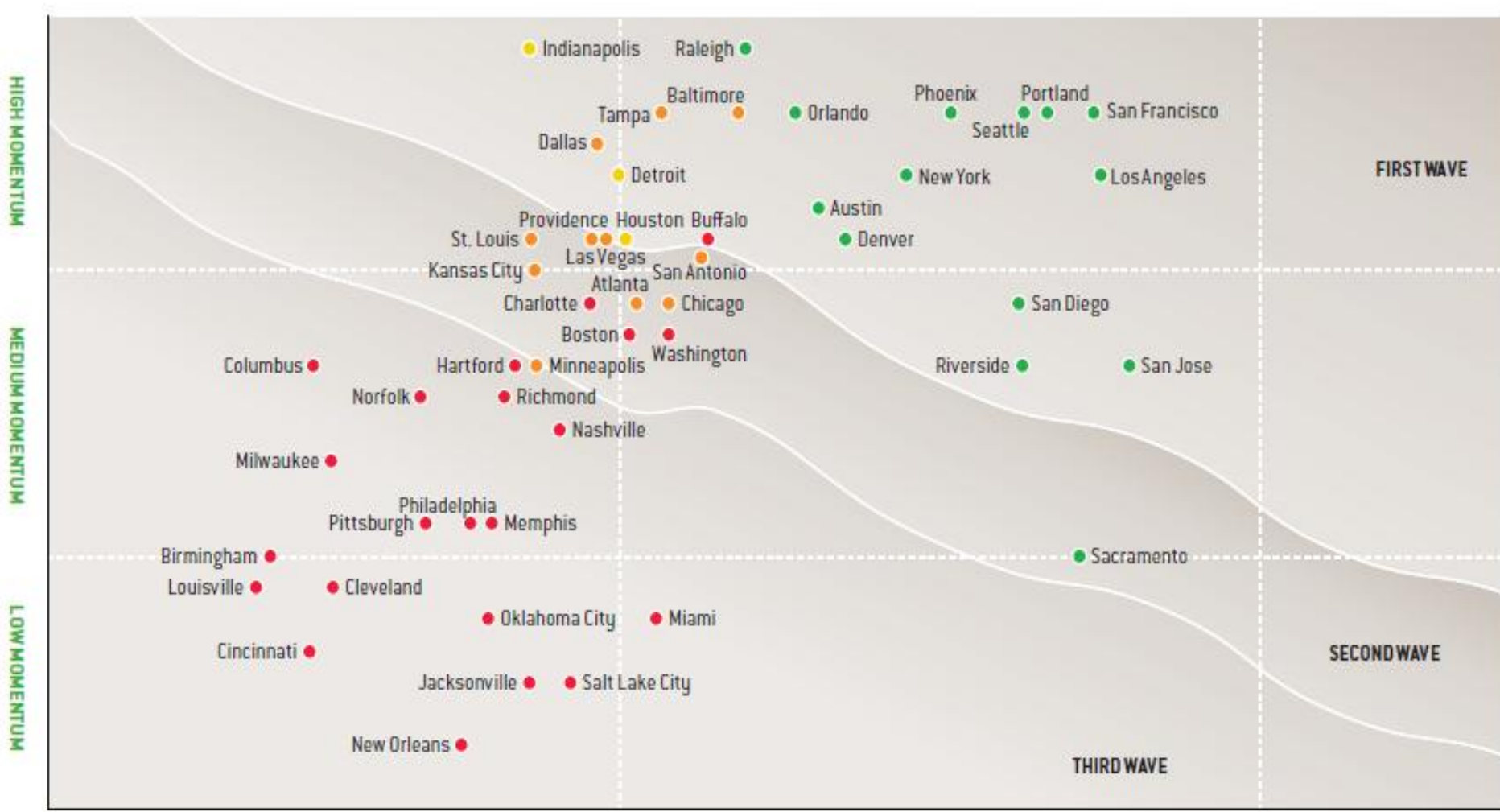


# PEV Deployment for the Greater Akron Area

PEV Readiness Task Force

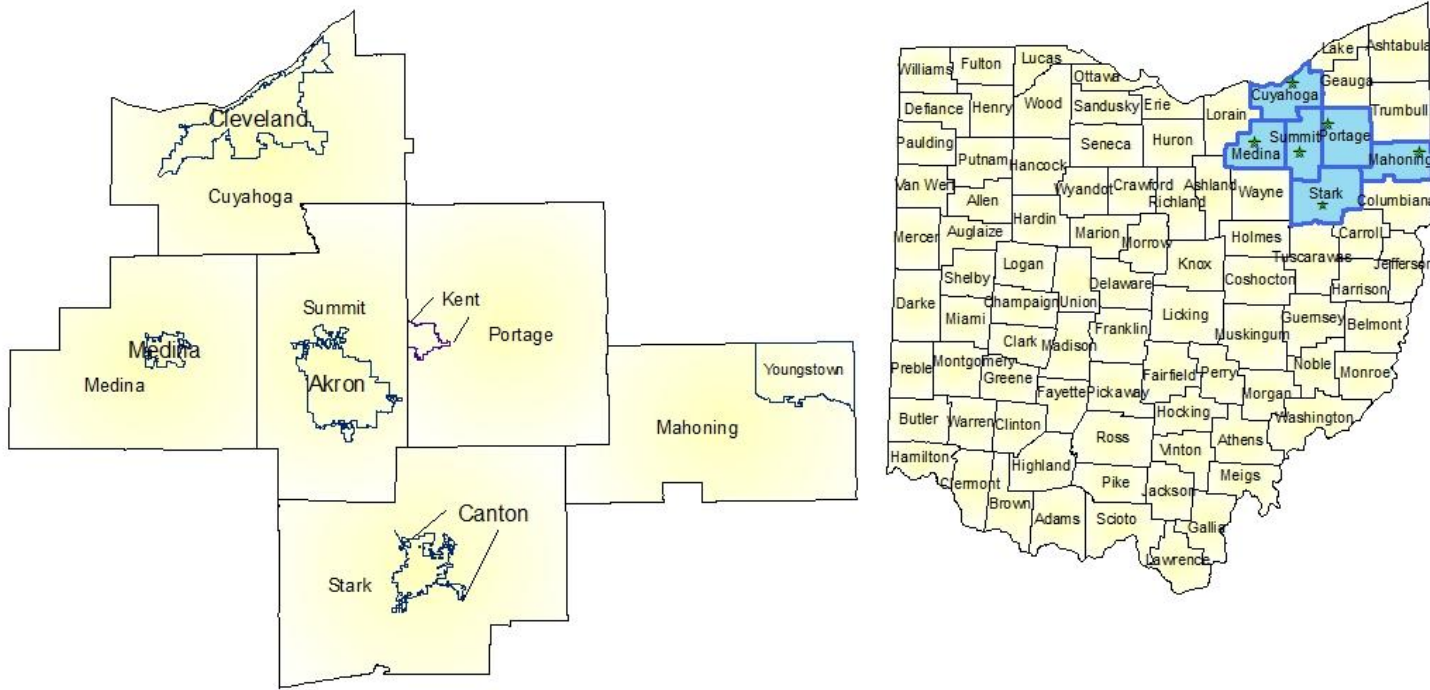
**JANUARY 20, 2011**



- Leader
- Aggressive follower
- Fast Follower
- Follower

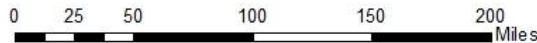
# INTRODUCTION

## LOCATION MAP OF CITIES - GREATER AKRON



- Akron City
- Canton City
- Cleveland City
- Kent City
- Medina City
- Youngstown City

- Summit County
- Cuyahoga County
- Mahoning County
- Medina County
- Portage County
- Stark County



Projection: State Plane Ohio North

# Socio-Economic Information

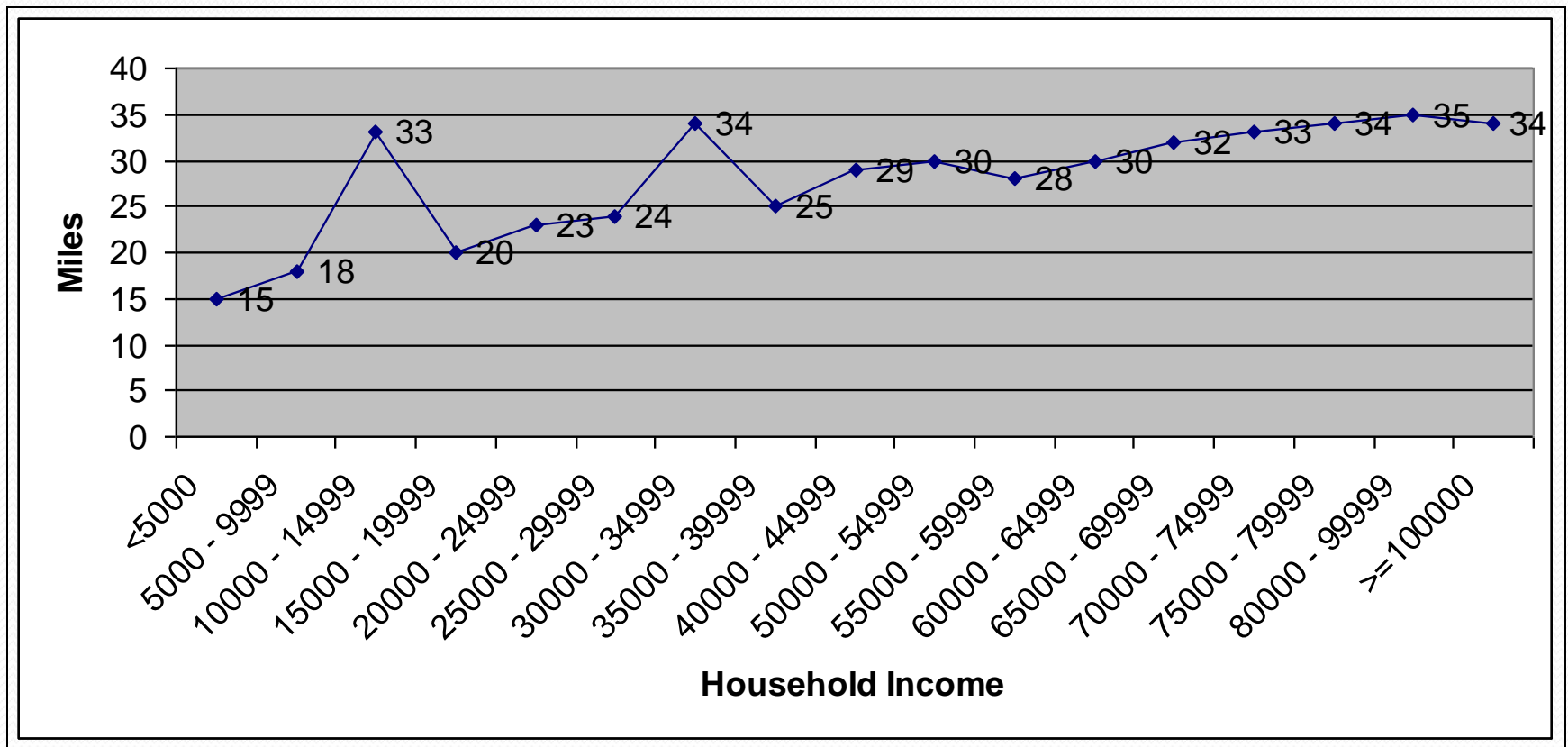
County	Population	% of State Population	Median Household Income	% of Bachelor's Degree or Higher	Number of Houses	% of Houses in State	Homeownership Rate
<b>Summit</b>	542,901	5%	\$49,528	25.10%	243,781	4.79%	70.20%
<b>Stark</b>	378,132	3%	\$44,682	17.90%	148,316	2.91%	72.40%
<b>Cuyahoga</b>	1,393,848	12%	\$44,324	25.10%	620,285	12.18%	63.20%
<b>Portage</b>	152,043	1%	\$52,725	21.00%	56,449	1.11%	71.30%
<b>Medina</b>	174,035	2%	\$65,621	24.80%	54,542	1.07%	81.30%
<b>Mahoning</b>	257,560	2%	\$40,508	17.50%	114,066	2.24%	72.80%
<b>Total</b>	2,898,519	25%	\$49,565	22%	1,237,439	24.00%	72.00%
<b>Ohio</b>	11,542,645		\$48,011	21.10%	4,445,773		69.10%



# Average Driving Distance

	Akron	Cleveland	Kent	North Canton	Rosemont	Canton	Youngstown	Brecksville	Fairlawn	Strongsville
Akron	0	39	11	19	11	24	51	25	6	37
Cleveland	39	0	38	54	30	60	74	16	30	20
Kent	11	38	0	29	23	34	41	26	22	20
North Canton	19	54	29	0	26	6	63	40	24	53
Rosemont	11	30	23	26	0	31	58	15	3	27
Canton	24	60	34	6	31	0	69	46	30	58
Youngstown	51	74	41	63	58	69	0	71	56	72
Brecksville	25	16	26	40	15	46	71	0	16	11
Fairlawn	6	30	22	24	3	30	56	16	0	26
Strongsville	37	20	20	53	27	58	72	11	26	0

# Miles Driven Per Day



# PEV Production Model



**Chevy Volt**



**Nissan Leaf**



**Mitsubishi i-MiEV**

Model Name	Charging time		Distance Covered per 1 charge	Battery Capacity	Cost per Charge
	120 V	240 V			
Chevy Volt	10-12 hours	4 hours	40 miles	16 KWH	\$1.60
Nissan Leaf	16 hours	8 hours	100 miles	24 KWH	\$2.40
Mitsubishi i-MiEV	14 hours	7 hours	80 miles	16 KWH	\$1.60

**\*\* Cost per charge for 1 KWH = 10 cents including Taxes**

# PEV Production Model Continued....



**Toyota Rav4 EV**






**CODA EV**

Model Name	Charging time		Distance Covered per 1 charge	Battery Capacity	Cost per Charge
	120 V	240 V			
Toyota Rav 4 EV	16 -18 hours	8 -10 hours	80 - 120 miles	28 KWH	\$2.80
CODA EV	17 hours	6 hours	120 miles	34 KWH	\$3.40

**\*\* Cost per charge for 1 KWH = 10 cents including Taxes**

# Charging Stations

S.No,	Model Number	Level	Power	Mounting Options	Design	Location
1	CT 1000	Level I	120 VAC,16 A	Wall, Pole & Bollard		Residential
2	CT 2100	Level I	120 VAC,16 A	Wall, Pole & Bollard		Residential
3	CT 500	Level II	08/240VAC,30A	Wall		Commercial
4	CT 2000	Level II	208/240VAC,30A	Wall, Pole & Bollard		Commercial
5	CT 3000	Level III	240-500 VDC,125A			Commercial

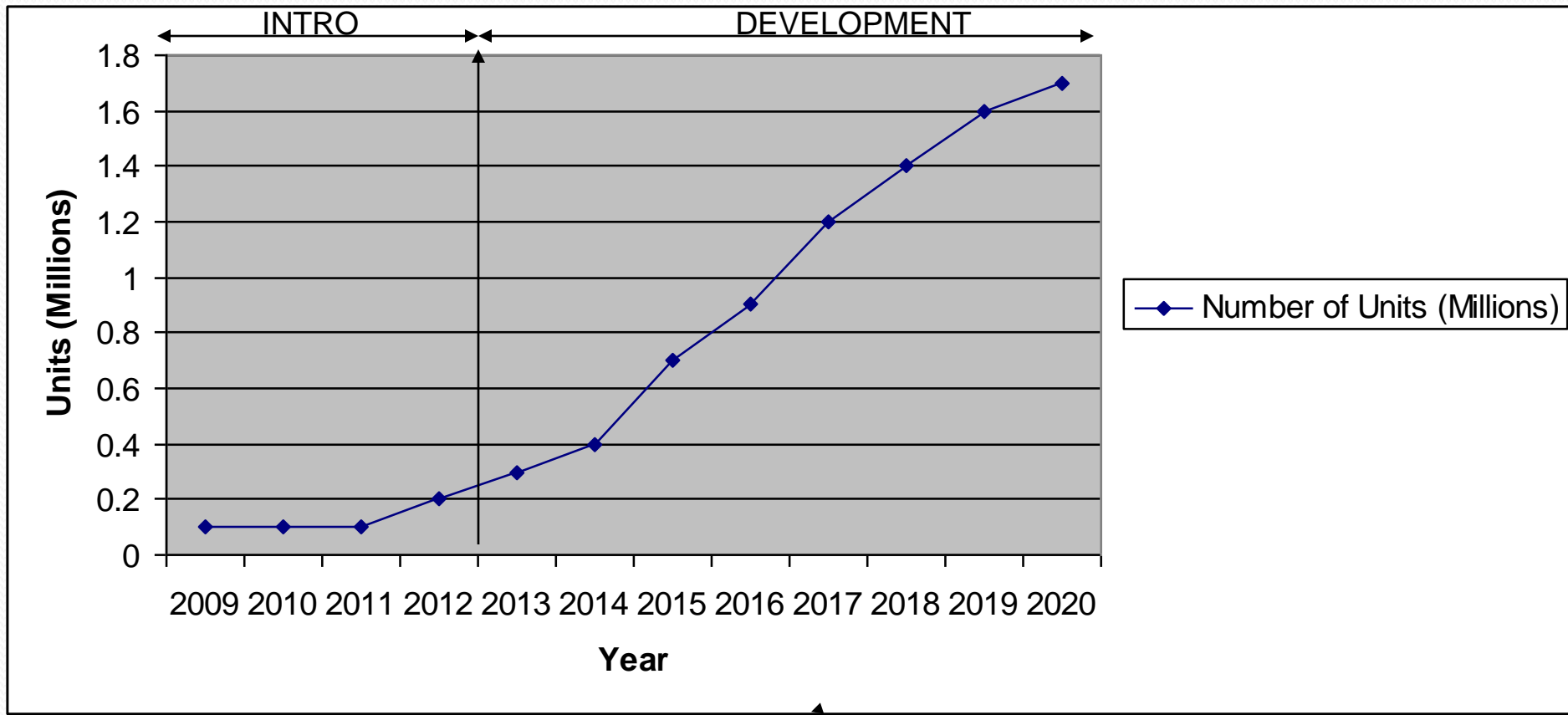
# Charging Stations

S.No,	Model Number	Level	Power	Mounting Options	Design	Location
1	EV 2001	Level I	110 VAC,20 A	Wall		Residential
2	EV 2002	Level I	120 VAC,20 A	Pole		Residential
3	EV 2102	Level II	240VAC,40A	Pole		Commercial
4	EV 2104	Level II	240VAC,40A	Wall		Residential
5	EV 2201	Combined Level I & II	110 VAC,20 A (or) 240VAC,40A	Bollard		Residential /Commercial

# Potential Buyers

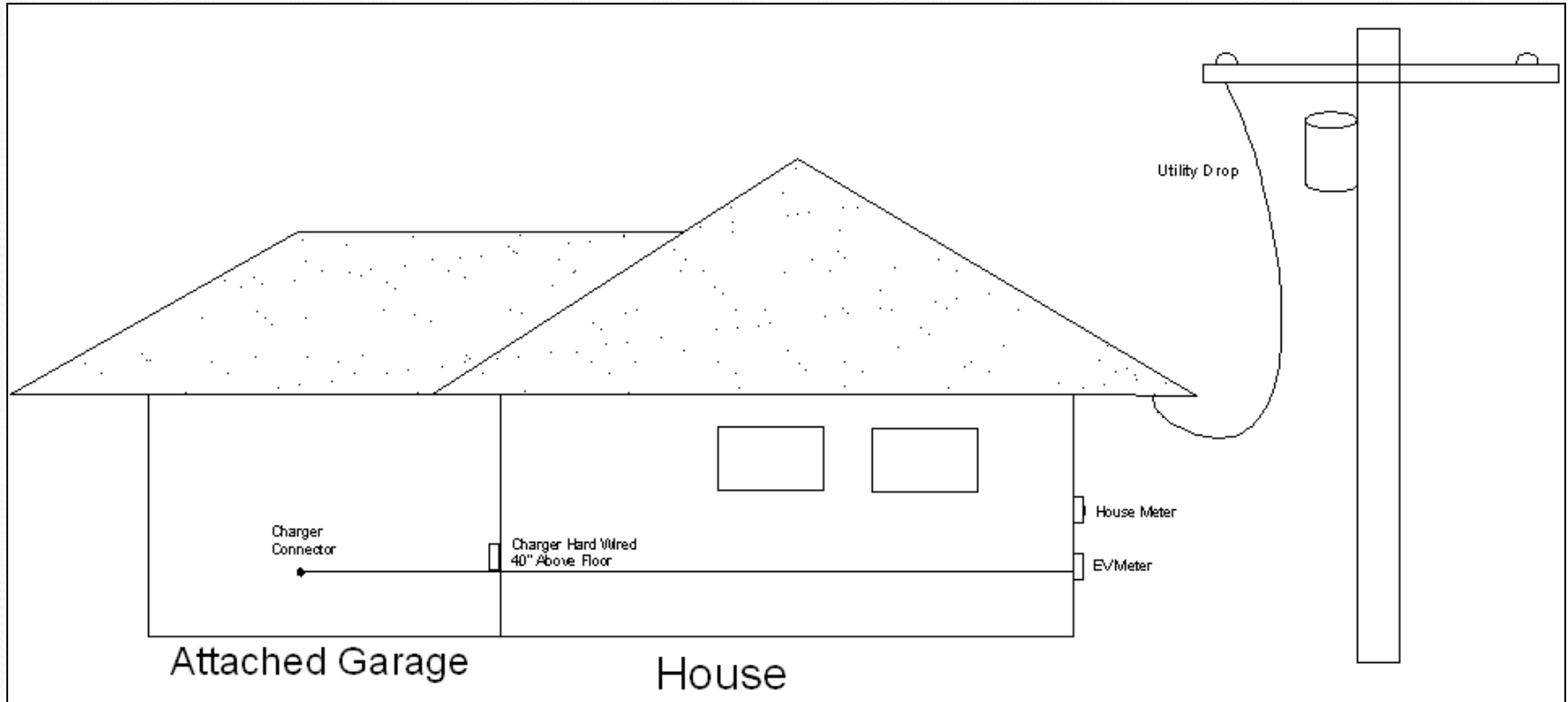
- Government entities
- Universities and research centers
- Companies involved in private industry
- The general public

# Projected Market Growth



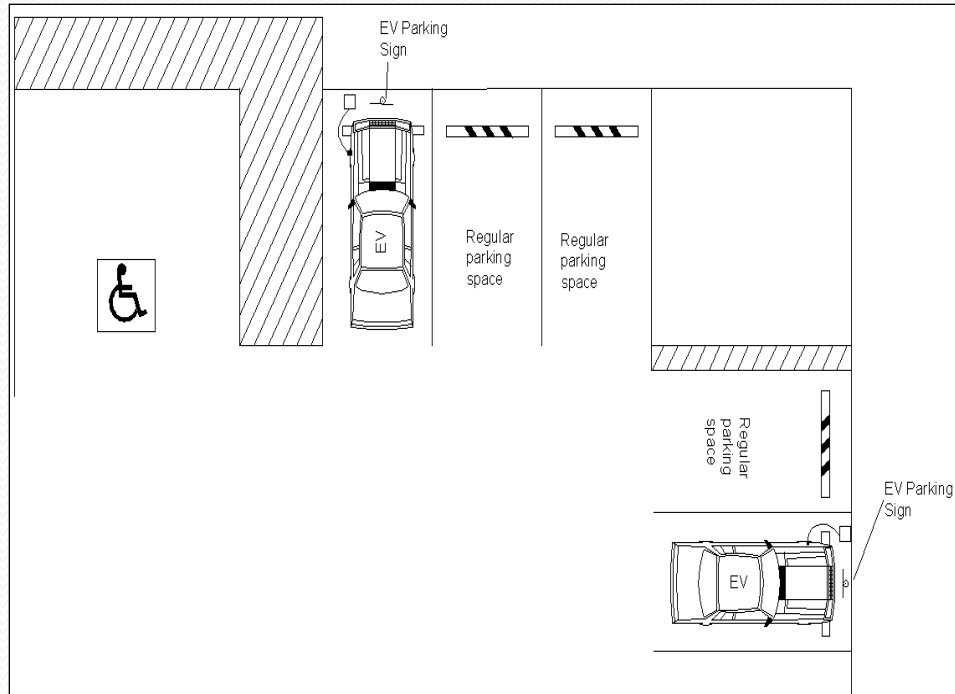
# Locations for Charging Stations

- Level 1 – Home use



# Locations Continued

- Level 2 – Work location and Parking garages



# Locations Continued

- Level 3 – Public locations for rapid charging



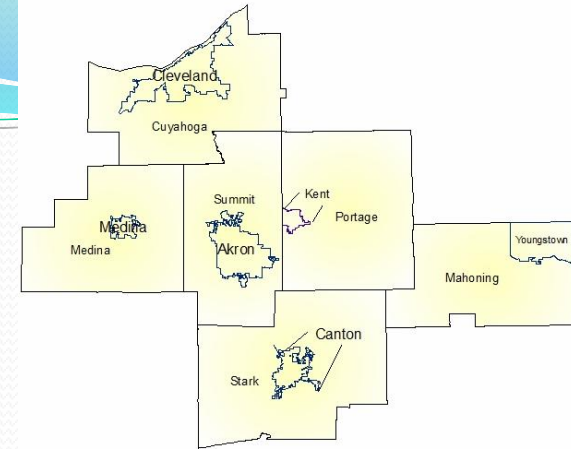
# Utility Supplier

- Charging vehicles create load on electrical grid

Model Name	Charging time		Distance Covered per 1 charge	Battery Capacity	Cost per Charge
	120 V	240 V			
<b>Chevy Volt</b>	<b>10-12 hours</b>	<b>4 hours</b>	<b>40 miles</b>	<b>16 KWH</b>	<b>\$1.60</b>
<b>Nissan Leaf</b>	<b>16 hours</b>	<b>8 hours</b>	<b>100 miles</b>	<b>24 KWH</b>	<b>\$2.40</b>
<b>Mitsubishi</b>	<b>14 hours</b>	<b>7 hours</b>	<b>80 miles</b>	<b>16 KWH</b>	<b>\$1.60</b>
<b>Toyota Rav 4 EV</b>	<b>16 -18 hours</b>	<b>8 -10 hours</b>	<b>80 - 120 miles</b>	<b>28 KWH</b>	<b>\$2.80</b>
<b>CODA EV</b>	<b>17 hours</b>	<b>6 hours</b>	<b>120 miles</b>	<b>34 KWH</b>	<b>\$3.40</b>

**\*\* Cost per charge for 1 KWH = 10 cents including Taxes**

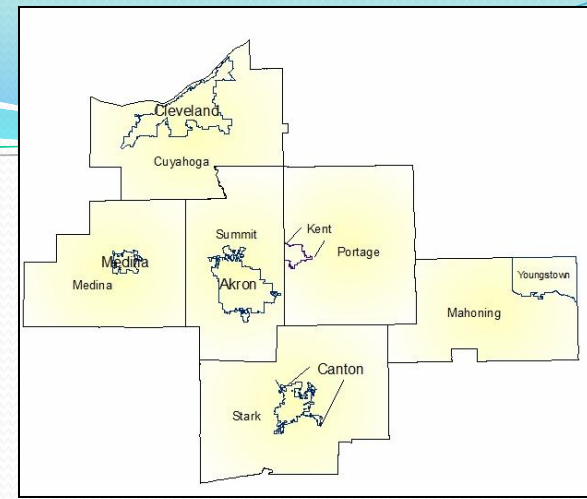
# Projected Load on Grid Greater Akron Area



The total number of vehicles that will be deployed for Phase – I is **50** and their impact on the grid are :

	Load if every vehicle charged at the same time		Load if charging is staged over 8 hours		Load if charging is staged over 12 hours	
	20 % of vehicles uses level I Charging	80% of vehicles uses level II Charging	20 % of vehicles uses level I Charging	80% of vehicles uses level II Charging	20 % of vehicles uses level I Charging	80% of vehicles uses level II Charging
	19.2 KW	288 KW	2.4 KW	36 KW	2.5 KW	24 KW
<b>Total</b>	<b>307.2 KW</b>		<b>38.4 KW</b>		<b>26.5 KW</b>	

# Projected Load on Grid Greater Akron Area

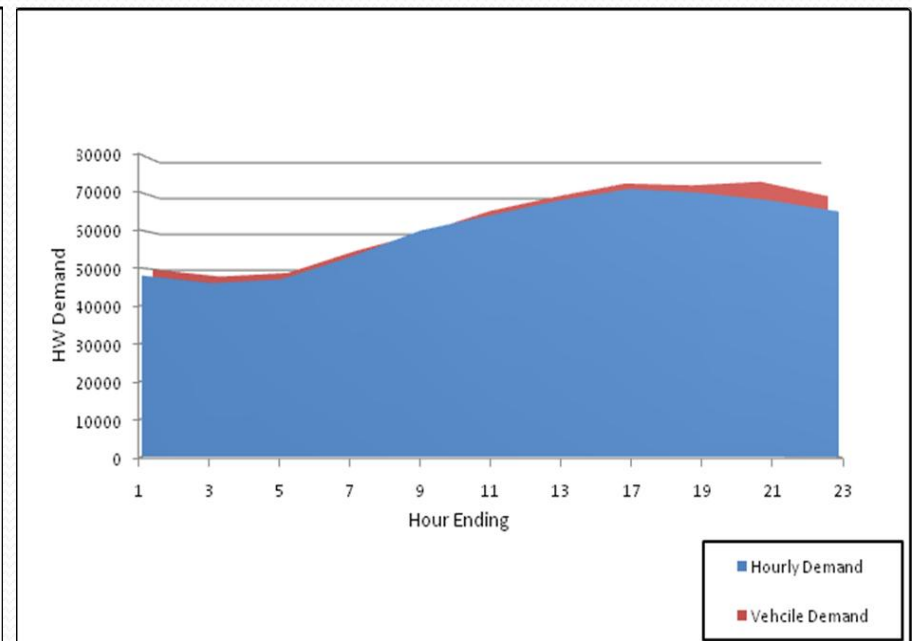
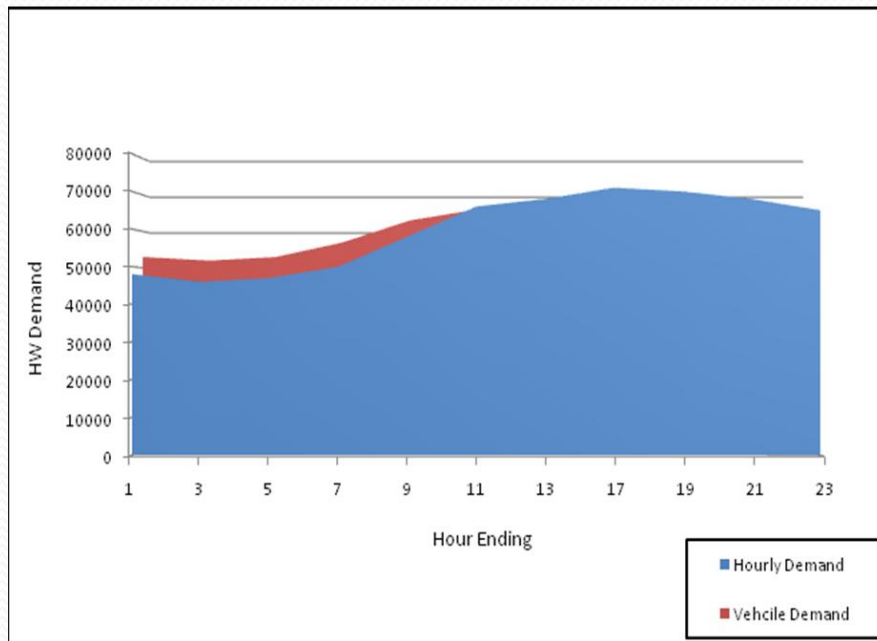


The electric load created when 5, 10 and 20 vehicles are charged at a Level II charging station is:

	Load if every one charged at same time			Load if charging is staged over 8 hours			Load if charging is staged over 12 hours		
	5 vehicles	10 Vehicles	20 Vehicles	5 vehicles	10 Vehicles	20 Vehicles	5 vehicles	10 Vehicles	20 Vehicles
	36 KW	72 KW	144 KW	4.5 KW	9 KW	18 KW	3 KW	6 KW	12 KW
<b>Total</b>	<b>252 KW</b>			<b>31.5 KW</b>			<b>21 KW</b>		

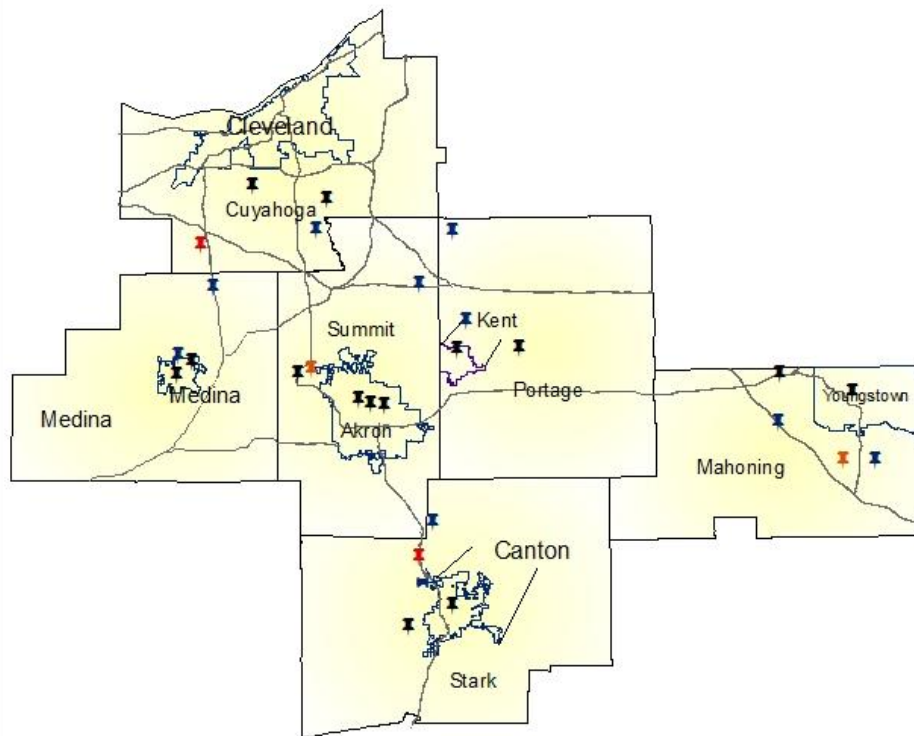
# Proposed Loads

- 2 proposed loads: worst case and staggered charging



# Deployment Locations

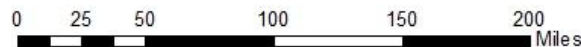
## LOCATION MAP OF CHARGING STATIONS - GREATER AKRON



T Level I Charging Station   
 X Level II Charging Station   
 X Level III Charging Station

- Interstate
- Akron City
- Cleveland City
- Canton City
- Kent City
- Medina City
- Youngstown City

- Interstate
- Summit County
- Cuyahoga County
- Mahoning County
- Medina County
- Portage County
- Stark County



Projection: State Plane Ohio North