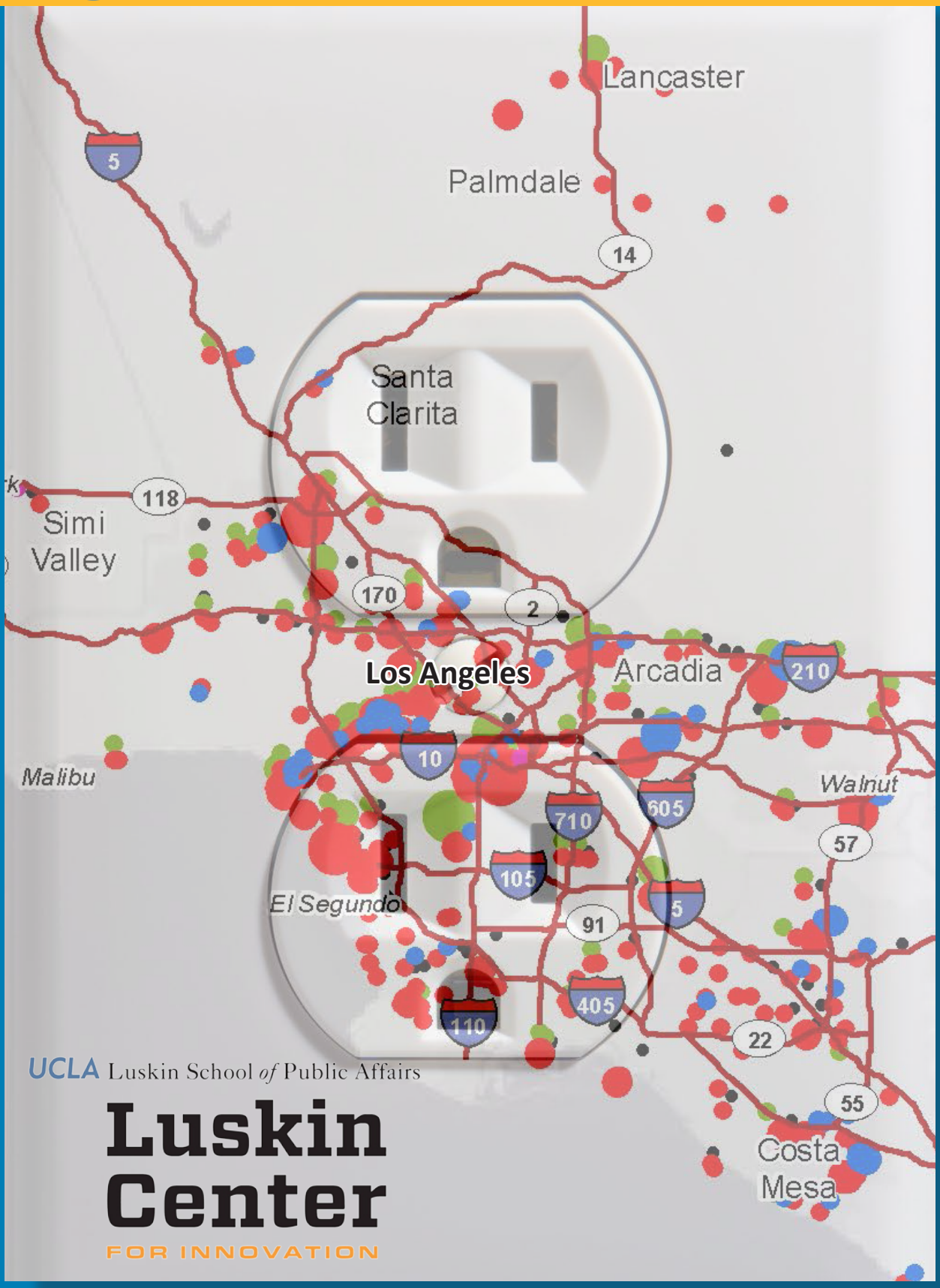
Southern California
Plug-in Electric Vehicle Atlas

SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS



UCLA Luskin School of Public Affairs

Luskin Center

FOR INNOVATION

Southern California Plug-in Electric Vehicle Readiness Atlas

About this Document

This document was prepared for the Southern California Association of Governments (SCAG) by the UCLA Luskin Center for Innovation. It constitutes Deliverable 11 of SCAG contract 12-021-C1 to support regional planning for plug-in electric vehicle (PEV) adoption. SCAG is coordinating a multi-stakeholder group of government agencies, utilities, and university researchers to prepare multi-faceted and interdisciplinary regional PEV readiness plans. Among other purposes, these plans will help illuminate and guide strategic infrastructure investment, PEV-related economic development, and supportive policy design in Southern California.

Disclaimer

Acknowledgements

We thank the Southern California Association of Governments, the South Coast Air Quality Management District, U.S. Department of Energy, and the California Energy Commission for support of this project. In particular, we thank Marco Anderson of SCAG, Patricia Kwon of SCAQMD and the other governmental and utility members of the SoCal PEV Coordinating Council for their guidance and assistance. We also thank the University of California Office of the President Multicampus Research Programs and Initiatives for its support.

For More Information

Contact J.R. DeShazo, Director, UCLA Luskin Center for Innovation, deshazo@ucla.edu; luskin.ucla.edu/ev

UCLA Luskin School of Public Affairs

Luskin Center FOR INNOVATION

SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

Southern California

Plug-in Electric Vehicle Readiness Atlas

Principal Investigator

J.R. DeShazo, Ph.D.

Spatial Analysis and Cartography

Norman Wong

Project Manager

Ayala Ben-Yehuda

Cover Design and Layout

Susan Woodward

Contributing Researchers

Vicky Hsu

Jon Overman

Tamar Sarkisian

Brett Williams, MPhil (cantab), Ph.D.

Southern California Plug-in Electric Vehicle Readiness Atlas

Contents

Preface

Council of government-level maps

Plug-in Electric Vehicles (PEVs) may provide a range of important benefits. For drivers, PEVs are a way to save money on fuel, avoid trips to the gasoline station, contribute to energy independence, and improve local air quality. For utilities, PEVs represent a new source of demand for power even as they support efficient use of energy produced during overnight hours. For state and regional air-quality regulators, PEVs help reduce criteria air pollutants and greenhouse gas (GHG) emissions.

To fully realize the benefits of PEVs, planners must coordinate and facilitate the growth of two complementary markets: one for PEVs and another for the electric charging opportunities that these vehicles need to refuel. This Atlas describes how many PEVs are in a given neighborhood and how their spatial concentrations vary over the course of a day as their drivers travel to workplaces and retail destinations. This Atlas also projects PEVs growth over the next ten years within neighborhoods and municipalities in each of the 15 councils of government (COGs) within the Southern California Association of Governments region.

This Atlas also maps potential charging infrastructure opportunities to support and complement growth in the PEV market. It identifies the locations and sizes of workplaces, multi-unit residences and retail establishments that could potentially host PEV charging. Lastly, the Atlas includes maps of other resources that support PEV charging, such as existing publicly-accessible charging stations and stand-alone parking facilities.

This spatial information enables to planners to know where PEVs are currently and where growth will occur in the future. This will help them prioritize the municipal planning reforms such as those described in the Southern California PEV Readiness Plan. It describes where latent PEV demand is constrained because of the challenges of installing charging opportunities in multi-unit residences. It also describes the locations of workplaces and retail establishments that are in neighborhoods with a higher density of PEVs during the day and evening. With this information, planners can take the next steps to provide the targeted technical assistance to these sites as described in the Southern California PEV Readiness Plan.

The technical appendix that follows the Atlas provides detailed information on data sources and analyses used to generate each map. This Atlas features the following maps of the neighborhoods and municipalities within each COG in the SCAG region:

1. **PEV registration density as of 2012.** Knowing how many PEVs are currently registered in a given area will indicate the location of current and near-future demand for residential charging. By extension, this information can help planners and utilities anticipate locations that will carry additional nighttime electrical load.

2. **PEV morning travel to work, providing spatial daytime PEV density at or near workplaces.** Understanding where PEVs are concentrated during morning peak hours (6:00 a.m. to 9:00 a.m.) can help planners and utilities identify neighborhoods where there will be demand for daytime charging.

3. **Workplaces identified by numbers of employees.** Planners can target the largest employers for workplace charging initiatives, as they presumably host the largest numbers of parking spaces on-site and can potentially serve the highest numbers of employees.

4. **Workplaces overlaid with morning peak PEV density.** Planners and utilities can use these maps to assess the potential utilization of workplace charging by comparing the spatial distribution of employers and weekday morning peak travel destinations for PEVs.

5. **Publicly-accessible charging locations, identified by power level and number of stations per location.** Planners can use these maps to compare the location of existing publicly-accessible charge stations with the locations of employment centers, retail centers and PEV daytime destinations, also mapped at the COG level in the Atlas. The maps can also be used to identify where there are gaps in meeting demand for charging. For MUDs that do not have parking, publicly-accessible sites will become important charging options. The maps identify the number of charging units/cords available at each location along with the level of service (Level 1, Level 2, etc., or "Unknown" where there is charging available but the quantity of connectors and their level of service could not be immediately determined). The maps are based on information collected during the summer and fall of 2012.

6. **Multi-unit dwellings (MUDs) by number of units and density.** City planners can use these maps to identify specific buildings and/or MUD owners that could potentially host charging on-site. Planners can use the maps to compare spatial distributions of MUD density with employment and commercial density, publicly accessible charging stations, and stand-alone parking areas to assess the potential for these other PEV sites to serve the charging needs of MUD residents. Mapping the precise location of MUDs and knowing the density of units on a site will be of particular use in utility planning. Utilities can use such maps to anticipate where upgrades may be needed for transformers and distribution stations to accommodate PEV charging at MUDs.

7. **Retail destinations, from strip development to regional centers.** Many PHEV drivers find it valuable to charge when visiting retail destinations in order to maximize electric miles driven. After locating general categories of retail charging opportunities on the map, planners can turn to Chapter 8 of the Southern California PEV Readiness Plan for more detailed descriptions of how long cars are typically parked at specific types of retail destinations.

8. **Retail destinations overlaid with PEV mid-day travel, providing spatial retail PEV density at or near retail centers.** Planners and utilities can use these maps to assess potential for retail charging by comparing the spatial distribution of retail centers and mid-day travel destinations (9:00 a.m. to 3:00 p.m.) for PEVs.

9. **Stand-alone parking facilities.** Publicly-accessible parking facilities can fill a gap in PEV charging, particularly in older urban cores where retail stores and even some workplaces and multi-unit dwellings do not have dedicated parking. Park and ride lots in particular may substitute for Level 1 workplace charging if workers leave their PEVs parked all day. Parking lots and structures greater than 2.5 acres that are not attached to other land uses are mapped at the COG level.

The Atlas provides this suite of spatial tools for PEV readiness planning for the following COGs:

- Arroyo Verdugo Subregion
- City of Los Angeles
- Coachella Valley Association of Governments
- Gateway Cities Council of Governments
- Imperial County Transportation Commission
- Las Virgenes Malibu Council of Governments
- North Los Angeles County
- Orange County Council of Governments
- San Bernardino Associated Governments
- San Fernando Valley Council of Governments
- San Gabriel Valley Council of Governments
- South Bay Cities Council of Governments
- Ventura County Council of Governments
- Western Riverside Council of Governments
- Westside Cities Council of Governments

Utility PEV growth projections

The Southern California Plug-in Electric Vehicle Atlas also provides projections of PEV growth and electric miles driven over 10 years by utility service territory for the following utilities[1]:

- Azusa Light and Power
- Burbank Water and Power
- Cerritos Electric Utility
- Glendale Water and Power
- Pasadena Water and Power
- Vernon Light and Power
- Anaheim Public Utilities Department
- City of Banning Electric Utility
- City of Colton Utilities Services
- Imperial Irrigation District
- Los Angeles Department of Water and Power
- Riverside Public Utilities
- Southern California Edison
- Anza Electric Cooperative
- City of Industry Electric Utility Service
- Moreno Valley Electric Utility
- Rancho Cucamonga Municipal Utility
- San Diego Gas & Electric (portion within SCAG)

These projections are designed to help regional planners and utilities locate current and future demand for PEV charging and coordinate efforts to meet that demand.

1 Utilities not represented by the Southern California Public Power Authority and that have less than 2 PEVs attributable to their service territories have been excluded from this analysis. They are Bear Valley Electrical Service, Corona Water and Power, Needles Public Utility Authority, and Victorville Municipal Utility Services.

Utilities Combined Projection[1]

Utility	Number of PEVs in utility territory	% share	2017			2022		
			Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
Azusa Light and Water	8	<1%	171	191	209	689	927	1,216
Burbank Water and Power	59	1%	1,260	1,406	1,540	5,083	6,836	8,965
Cerritos Electric Utility	53	1%	1,132	1,263	1,383	4,566	6,141	8,053
City of Colton Public Utilities	1	<1%	21	24	26	86	116	152
Glendale Water and Power	103	1%	2,200	2,454	2,688	8,874	11,934	15,650
Pasadena Water and Power	119	1%	2,542	2,836	3,106	10,253	13,788	18,081
Vernon Light and Power	1	<1%	21	24	26	86	116	152
Anaheim Public Utilities Department	99	1%	2,114	2,359	2,584	8,529	11,471	15,042
City of Banning Electric Utility	1	<1%	21	24	26	86	116	152
Imperial Irrigation District	59	1%	1,260	1,406	1,540	5,083	6,836	8,965
Los Angeles Department of Water and Power	1,809	22%	38,636	43,105	47,213	155,856	209,603	274,864
Riverside Public Utilities	65	1%	1,388	1,549	1,696	5,600	7,531	9,876
Southern California Edison	5,650	68%	120,672	134,628	147,459	486,781	654,647	858,475
Anza Electric Cooperative	2	<1%	43	48	52	172	232	304
Moreno Valley Electric Utility	5	<1%	107	119	130	431	579	760
Rancho Cucamonga Municipal Utility	9	<1%	192	214	235	775	1,043	1,367
San Diego Gas and Electric [2]	278	3%	5,937	6,624	7,256	23,951	32,211	42,240
TOTAL	8,321	100%	177,717	198,274	217,169	716,901	964,127	1,264,314

1 Utilities not represented by the Southern California Public Power Authority and that have less than 2 PEVs attributable to their service territories have been excluded from this analysis. They are Bear Valley Electrical Service, Corona Water and Power, City of Needles, and Victorville Municipal Utility Services.

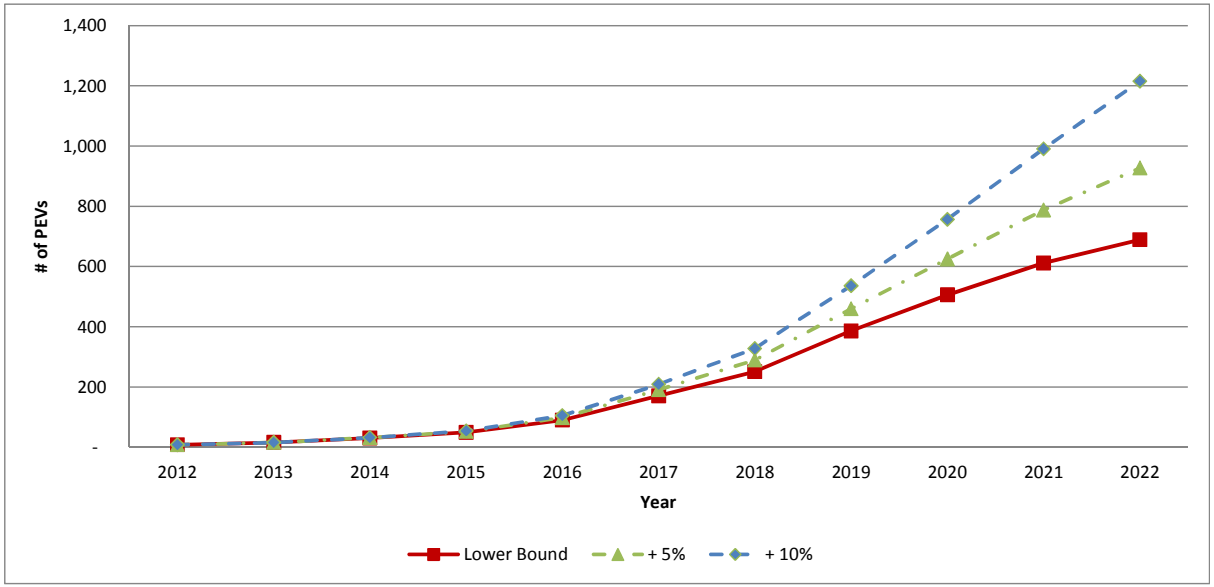
2 Portion within SCAG

Azusa Light and Water

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	8	8	8	58,400	58,400	58,400
2013	16	16	16	116,800	116,800	116,800
2014	31	32	32	225,563	231,403	233,600
2015	49	52	54	358,972	379,837	395,122
2016	90	98	105	658,473	715,737	764,297
2017	171	191	209	1,247,295	1,391,552	1,524,178
2018	251	289	327	1,831,295	2,112,673	2,390,236
2019	386	460	536	2,816,059	3,354,378	3,914,588
2020	506	625	756	3,690,987	4,564,278	5,522,280
2021	612	787	991	4,464,117	5,748,545	7,231,228
2022	689	927	1,216	5,031,508	6,766,614	8,873,443

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

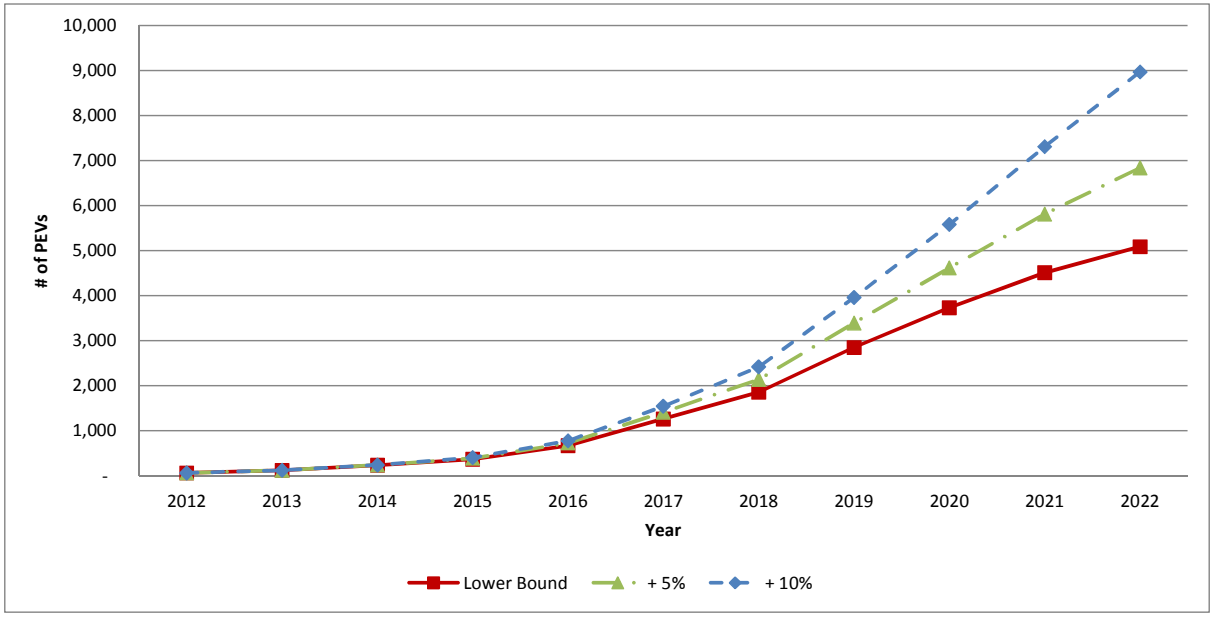


Burbank Water and Power

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	59	59	59	430,700	430,700	430,700
2013	118	118	118	861,400	861,400	861,400
2014	228	234	236	1,663,529	1,706,599	1,722,800
2015	363	384	399	2,647,422	2,801,296	2,914,028
2016	665	723	772	4,856,241	5,278,561	5,636,687
2017	1,260	1,406	1,540	9,198,804	10,262,699	11,240,811
2018	1,850	2,134	2,415	13,505,804	15,580,964	17,627,987
2019	2,845	3,389	3,955	20,768,433	24,738,541	28,870,084
2020	3,729	4,611	5,579	27,221,030	33,661,548	40,726,812
2021	4,510	5,808	7,306	32,922,866	42,395,521	53,330,309
2022	5,083	6,836	8,965	37,107,373	49,903,782	65,441,640

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

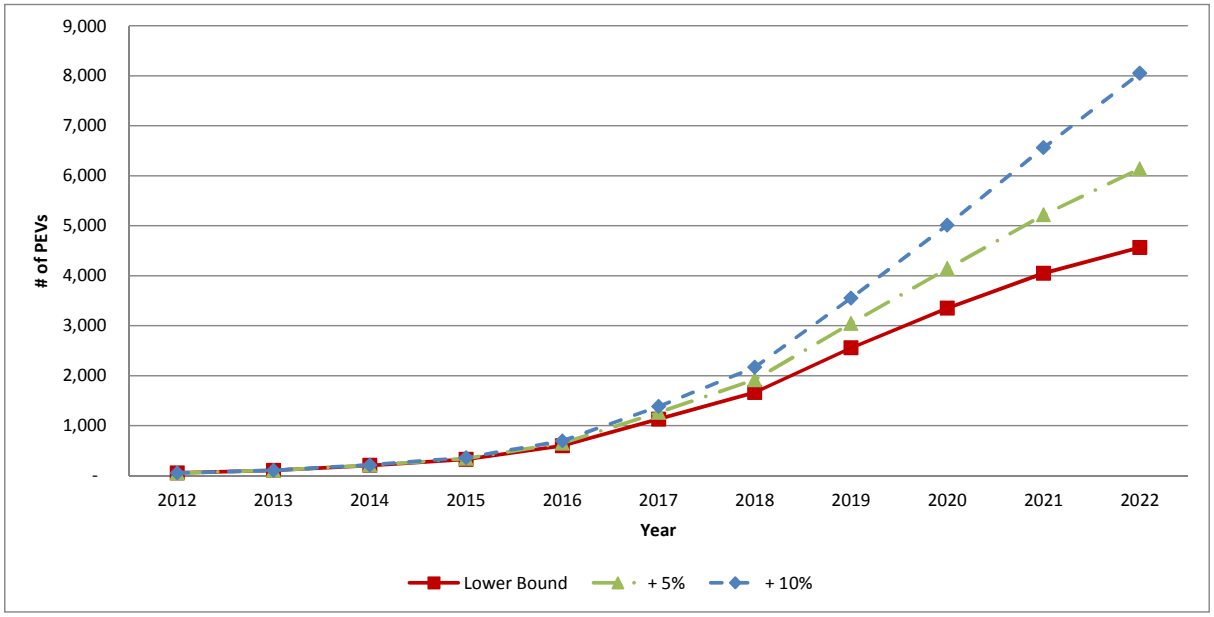


Cerritos Electric Utility

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	53	53	53	386,900	386,900	386,900
2013	106	106	106	773,800	773,800	773,800
2014	205	210	212	1,494,357	1,533,047	1,547,600
2015	326	345	359	2,378,193	2,516,418	2,617,686
2016	598	650	694	4,362,386	4,741,758	5,063,465
2017	1,132	1,263	1,383	8,263,332	9,219,035	10,097,678
2018	1,662	1,917	2,169	12,132,332	13,996,459	15,835,311
2019	2,556	3,044	3,553	18,656,389	22,222,757	25,934,143
2020	3,350	4,142	5,012	24,452,790	30,238,340	36,585,102
2021	4,051	5,217	6,563	29,574,778	38,084,112	47,906,888
2022	4,566	6,141	8,053	33,333,742	44,828,821	58,786,558

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

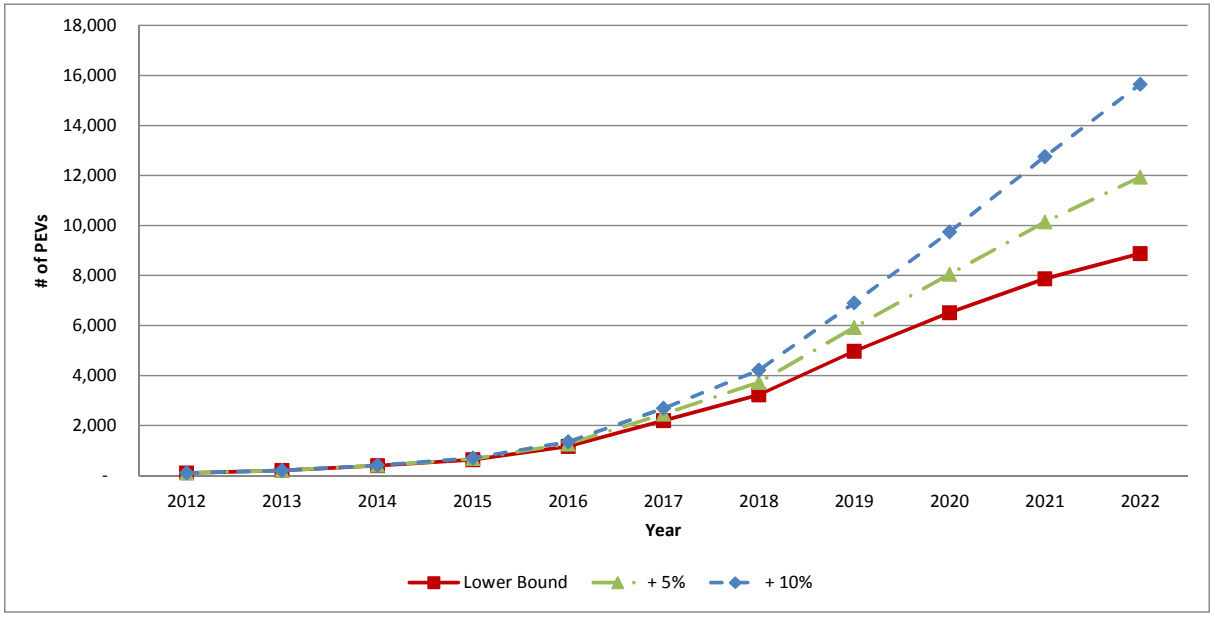


Glendale Water and Power

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	103	103	103	751,900	751,900	751,900
2013	206	206	206	1,503,800	1,503,800	1,503,800
2014	398	408	412	2,904,128	2,979,318	3,007,600
2015	633	670	697	4,621,771	4,890,398	5,087,202
2016	1,161	1,262	1,348	8,477,845	9,215,115	9,840,319
2017	2,200	2,454	2,688	16,058,928	17,916,238	19,623,789
2018	3,230	3,726	4,216	23,577,928	27,200,666	30,774,283
2019	4,967	5,916	6,904	36,256,756	43,187,623	50,400,316
2020	6,510	8,050	9,740	47,521,460	58,765,076	71,099,350
2021	7,873	10,139	12,754	57,475,512	74,012,519	93,102,065
2022	8,874	11,934	15,650	64,780,669	87,120,161	114,245,575

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

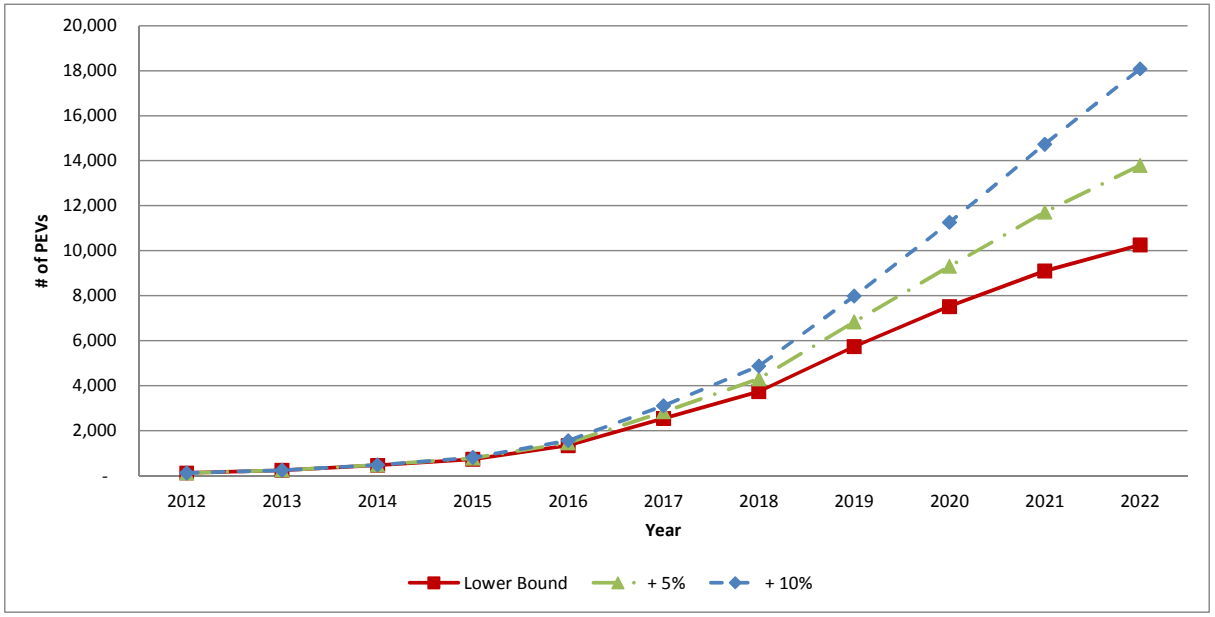


Pasadena Water and Power

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	119	119	119	868,700	868,700	868,700
2013	238	238	238	1,737,400	1,737,400	1,737,400
2014	460	472	476	3,355,254	3,442,124	3,474,800
2015	731	774	805	5,339,716	5,650,071	5,877,447
2016	1,342	1,458	1,557	9,794,792	10,646,589	11,368,912
2017	2,542	2,836	3,106	18,553,519	20,699,343	22,672,145
2018	3,732	4,305	4,871	27,240,519	31,426,012	35,554,754
2019	5,738	6,835	7,977	41,888,873	49,896,380	58,229,491
2020	7,521	9,300	11,253	54,903,434	67,893,632	82,143,909
2021	9,096	11,714	14,735	66,403,747	85,509,609	107,564,522
2022	10,253	13,788	18,081	74,843,685	100,653,390	131,992,461

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

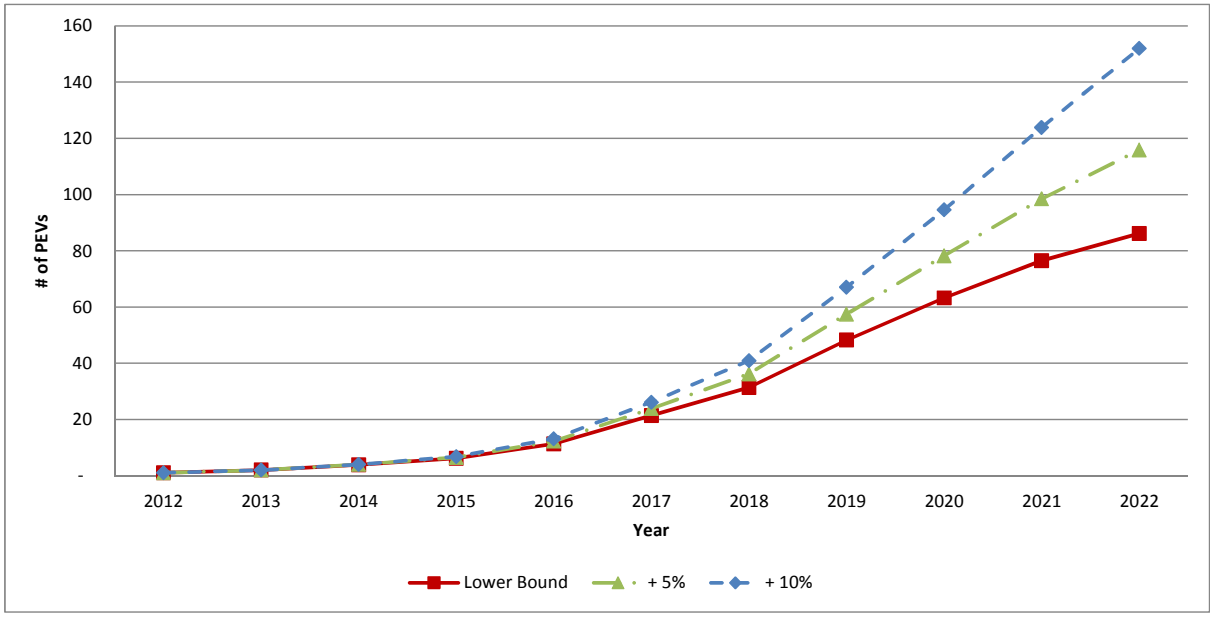


Vernon Light and Power

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	1	1	1	7,300	7,300	7,300
2013	2	2	2	14,600	14,600	14,600
2014	4	4	4	28,195	28,925	29,200
2015	6	7	7	44,872	47,480	49,390
2016	11	12	13	82,309	89,467	95,537
2017	21	24	26	155,912	173,944	190,522
2018	31	36	41	228,912	264,084	298,779
2019	48	57	67	352,007	419,297	489,323
2020	63	78	95	461,373	570,535	690,285
2021	76	98	124	558,015	718,568	903,904
2022	86	116	152	628,939	845,827	1,109,180

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

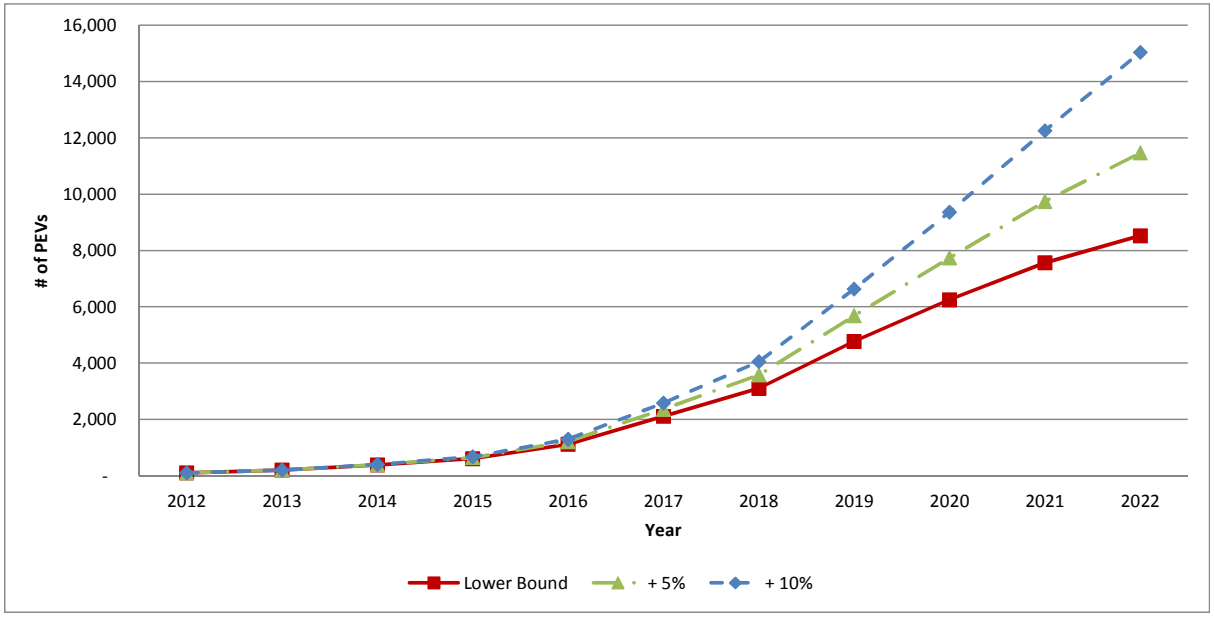


Anaheim Public Utilities Department

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	99	99	99	722,700	722,700	722,700
2013	198	198	198	1,445,400	1,445,400	1,445,400
2014	382	392	396	2,791,346	2,863,616	2,890,800
2015	609	644	670	4,442,284	4,700,479	4,889,641
2016	1,116	1,213	1,296	8,148,608	8,857,246	9,458,170
2017	2,114	2,359	2,584	15,435,281	17,220,461	18,861,700
2018	3,104	3,581	4,052	22,662,281	26,144,329	29,579,165
2019	4,774	5,686	6,636	34,848,727	41,510,433	48,443,022
2020	6,257	7,737	9,361	45,675,966	56,482,937	68,338,210
2021	7,568	9,745	12,258	55,243,453	71,138,246	89,486,451
2022	8,529	11,471	15,042	62,264,915	83,736,854	109,808,854

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

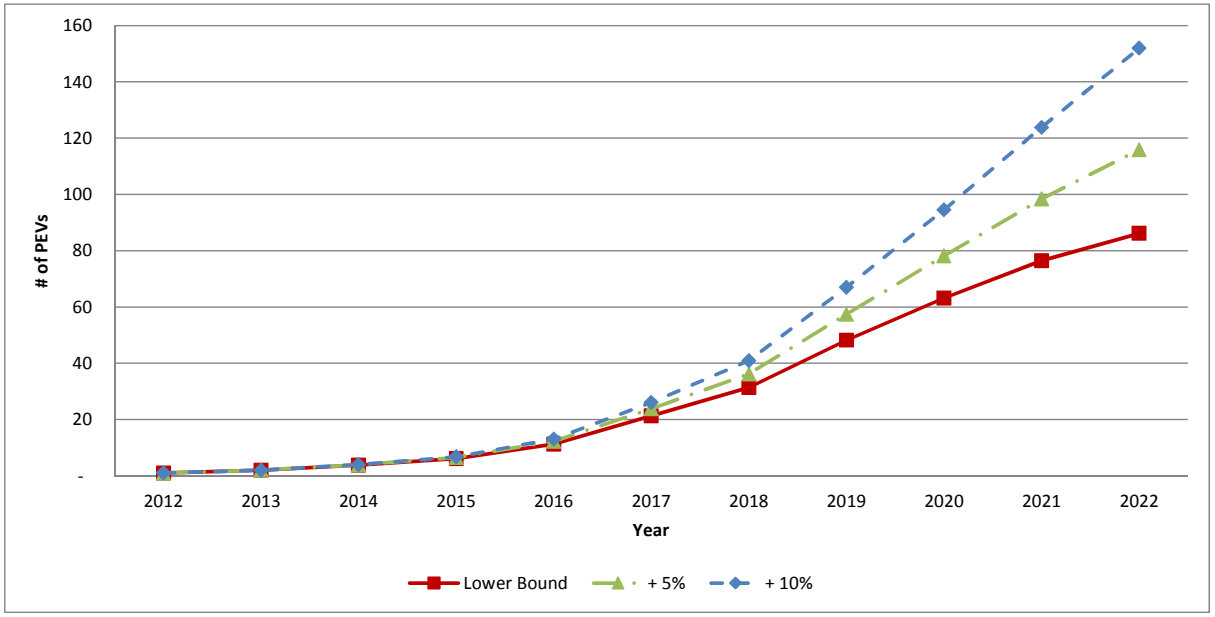


City of Banning Electric Utility

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	1	1	1	7,300	7,300	7,300
2013	2	2	2	14,600	14,600	14,600
2014	4	4	4	28,195	28,925	29,200
2015	6	7	7	44,872	47,480	49,390
2016	11	12	13	82,309	89,467	95,537
2017	21	24	26	155,912	173,944	190,522
2018	31	36	41	228,912	264,084	298,779
2019	48	57	67	352,007	419,297	489,323
2020	63	78	95	461,373	570,535	690,285
2021	76	98	124	558,015	718,568	903,904
2022	86	116	152	628,939	845,827	1,109,180

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

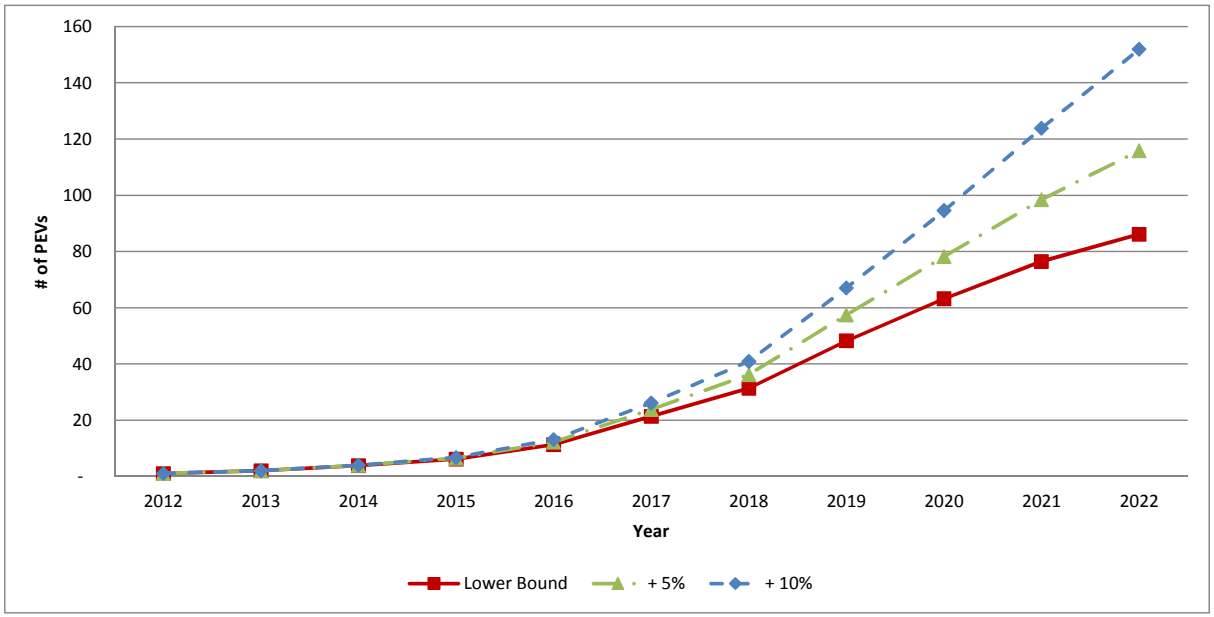


City of Colton Utilities Services

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	1	1	1	7,300	7,300	7,300
2013	2	2	2	14,600	14,600	14,600
2014	4	4	4	28,195	28,925	29,200
2015	6	7	7	44,872	47,480	49,390
2016	11	12	13	82,309	89,467	95,537
2017	21	24	26	155,912	173,944	190,522
2018	31	36	41	228,912	264,084	298,779
2019	48	57	67	352,007	419,297	489,323
2020	63	78	95	461,373	570,535	690,285
2021	76	98	124	558,015	718,568	903,904
2022	86	116	152	628,939	845,827	1,109,180

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

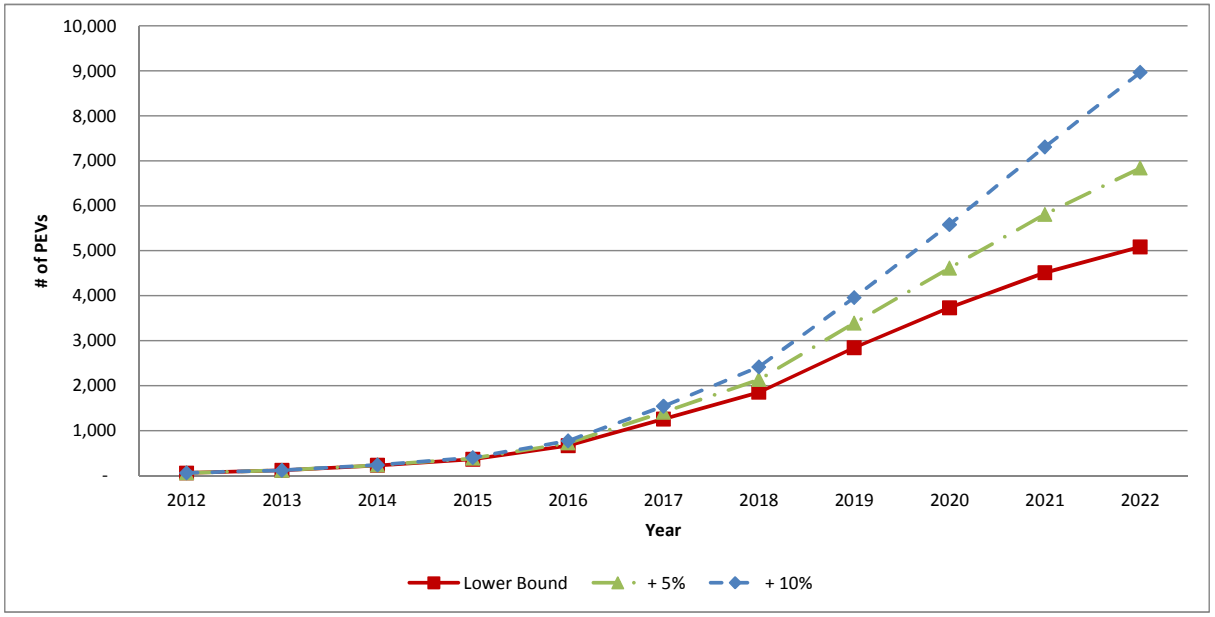


Imperial Irrigation District

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	59	59	59	430,700	430,700	430,700
2013	118	118	118	861,400	861,400	861,400
2014	228	234	236	1,663,529	1,706,599	1,722,800
2015	363	384	399	2,647,422	2,801,296	2,914,028
2016	665	723	772	4,856,241	5,278,561	5,636,687
2017	1,260	1,406	1,540	9,198,804	10,262,699	11,240,811
2018	1,850	2,134	2,415	13,505,804	15,580,964	17,627,987
2019	2,845	3,389	3,955	20,768,433	24,738,541	28,870,084
2020	3,729	4,611	5,579	27,221,030	33,661,548	40,726,812
2021	4,510	5,808	7,306	32,922,866	42,395,521	53,330,309
2022	5,083	6,836	8,965	37,107,373	49,903,782	65,441,640

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

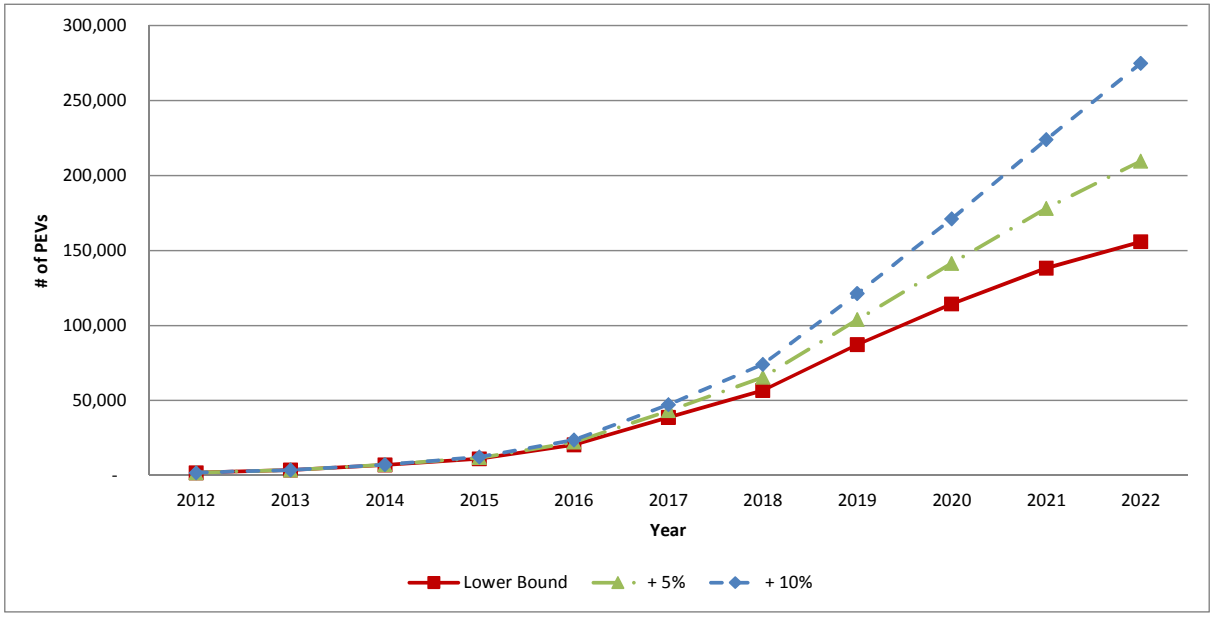


Los Angeles Department of Water and Power

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	1,809	1,809	1,809	13,205,700	13,205,700	13,205,700
2013	3,618	3,618	3,618	26,411,400	26,411,400	26,411,400
2014	6,987	7,168	7,236	51,005,502	52,326,072	52,822,800
2015	11,120	11,766	12,239	81,172,651	85,890,575	89,347,069
2016	20,397	22,171	23,675	148,897,296	161,846,046	172,826,569
2017	38,636	43,105	47,213	282,044,675	314,664,795	344,654,709
2018	56,726	65,442	74,040	414,101,675	477,728,201	540,492,015
2019	87,230	103,905	121,258	636,781,277	758,508,829	885,186,132
2020	114,332	141,383	171,058	834,624,471	1,032,097,306	1,248,725,475
2021	138,281	178,067	223,995	1,009,448,554	1,299,889,777	1,635,161,509
2022	155,856	209,603	274,864	1,137,749,805	1,530,100,693	2,006,507,237

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

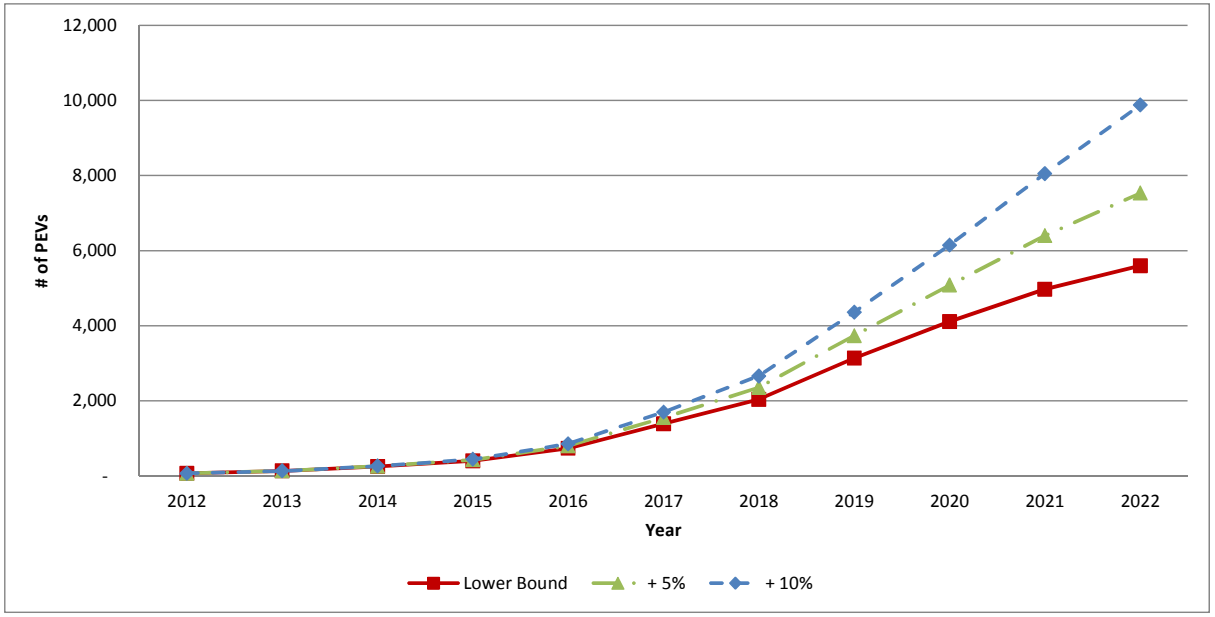


Riverside Public Utilities

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	65	65	65	474,500	474,500	474,500
2013	130	130	130	949,000	949,000	949,000
2014	251	258	260	1,832,702	1,880,152	1,898,000
2015	400	423	440	2,916,651	3,086,173	3,210,370
2016	733	797	851	5,350,096	5,815,364	6,209,910
2017	1,388	1,549	1,696	10,134,275	11,306,364	12,383,945
2018	2,038	2,351	2,660	14,879,275	17,165,469	19,420,664
2019	3,134	3,733	4,357	22,880,477	27,254,325	31,806,025
2020	4,108	5,080	6,146	29,989,271	37,084,757	44,868,522
2021	4,969	6,398	8,048	36,270,954	46,706,930	58,753,730
2022	5,600	7,531	9,876	40,881,005	54,978,742	72,096,722

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

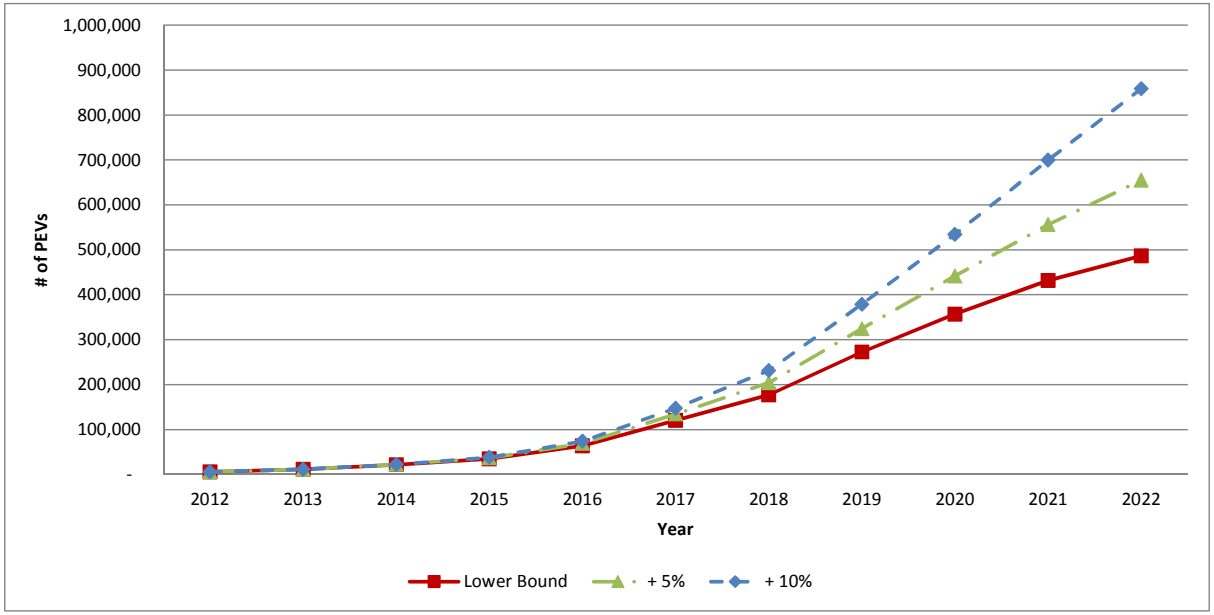


Southern California Edison

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	5,650	5,650	5,650	41,245,000	41,245,000	41,245,000
2013	11,300	11,300	11,300	82,490,000	82,490,000	82,490,000
2014	21,822	22,387	22,600	159,304,083	163,428,583	164,980,000
2015	34,729	36,748	38,227	253,524,312	268,259,672	279,055,245
2016	63,705	69,245	73,943	465,046,835	505,489,308	539,784,473
2017	120,672	134,628	147,459	880,902,385	982,783,911	1,076,450,582
2018	177,172	204,394	231,247	1,293,352,385	1,492,075,367	1,688,103,860
2019	272,444	324,525	378,723	1,988,841,468	2,369,029,786	2,764,677,527
2020	357,090	441,578	534,262	2,606,759,679	3,223,521,161	3,900,109,967
2021	431,888	556,152	699,597	3,152,782,936	4,059,910,027	5,107,055,016
2022	486,781	654,647	858,475	3,553,502,706	4,778,921,457	6,266,868,926

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

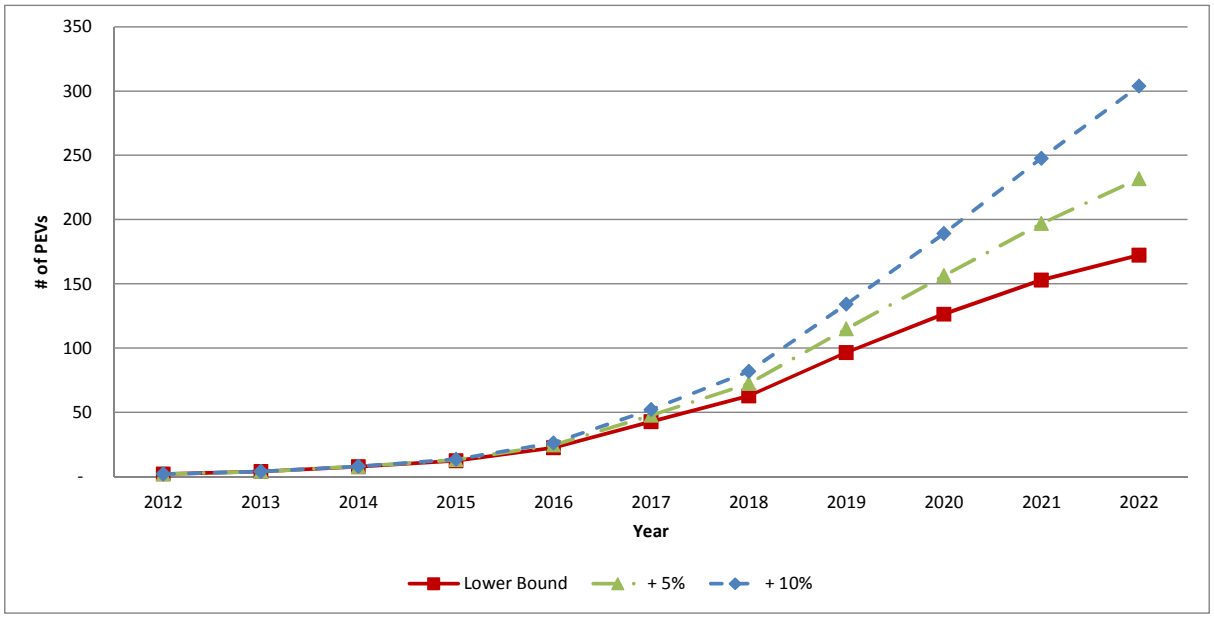


Anza Electric Cooperative

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	2	2	2	14,600	14,600	14,600
2013	4	4	4	29,200	29,200	29,200
2014	8	8	8	56,391	57,851	58,400
2015	12	13	14	89,743	94,959	98,781
2016	23	25	26	164,618	178,934	191,074
2017	43	48	52	311,824	347,888	381,044
2018	63	72	82	457,824	528,168	597,559
2019	96	115	134	704,015	838,595	978,647
2020	126	156	189	922,747	1,141,069	1,380,570
2021	153	197	248	1,116,029	1,437,136	1,807,807
2022	172	232	304	1,257,877	1,691,654	2,218,361

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

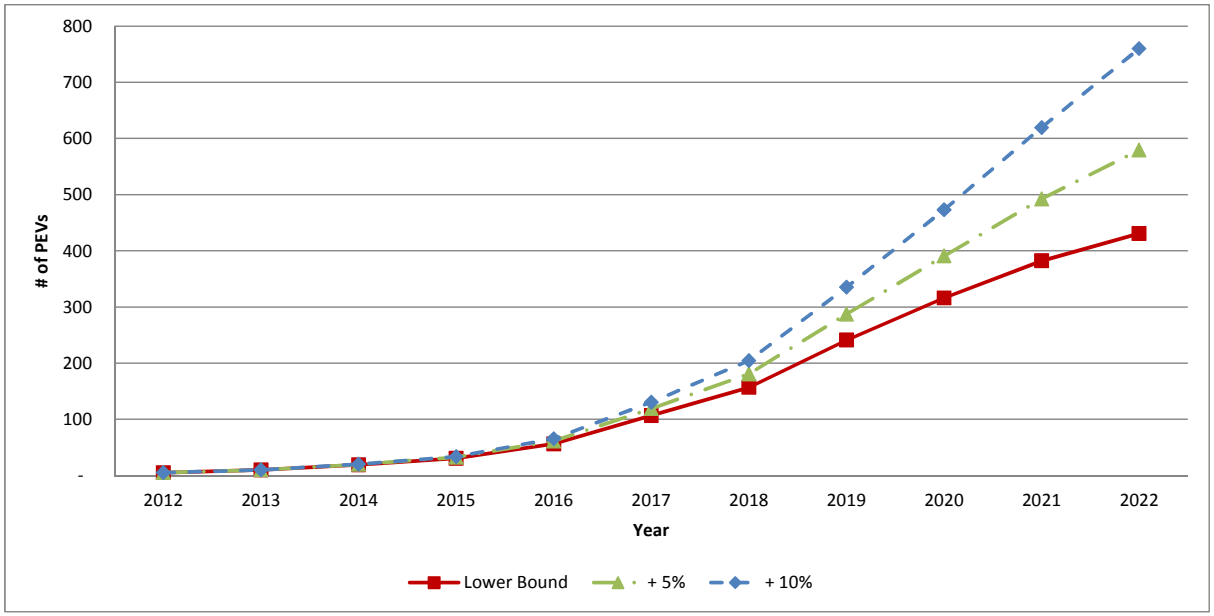


Moreno Valley Electric Utility

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	5	5	5	36,500	36,500	36,500
2013	10	10	10	73,000	73,000	73,000
2014	19	20	20	140,977	144,627	146,000
2015	31	33	34	224,358	237,398	246,952
2016	56	61	65	411,546	447,336	477,685
2017	107	119	130	779,560	869,720	952,611
2018	157	181	205	1,144,560	1,320,421	1,493,897
2019	241	287	335	1,760,037	2,096,487	2,446,617
2020	316	391	473	2,306,867	2,852,674	3,451,425
2021	382	492	619	2,790,073	3,592,841	4,519,518
2022	431	579	760	3,144,693	4,229,134	5,545,902

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

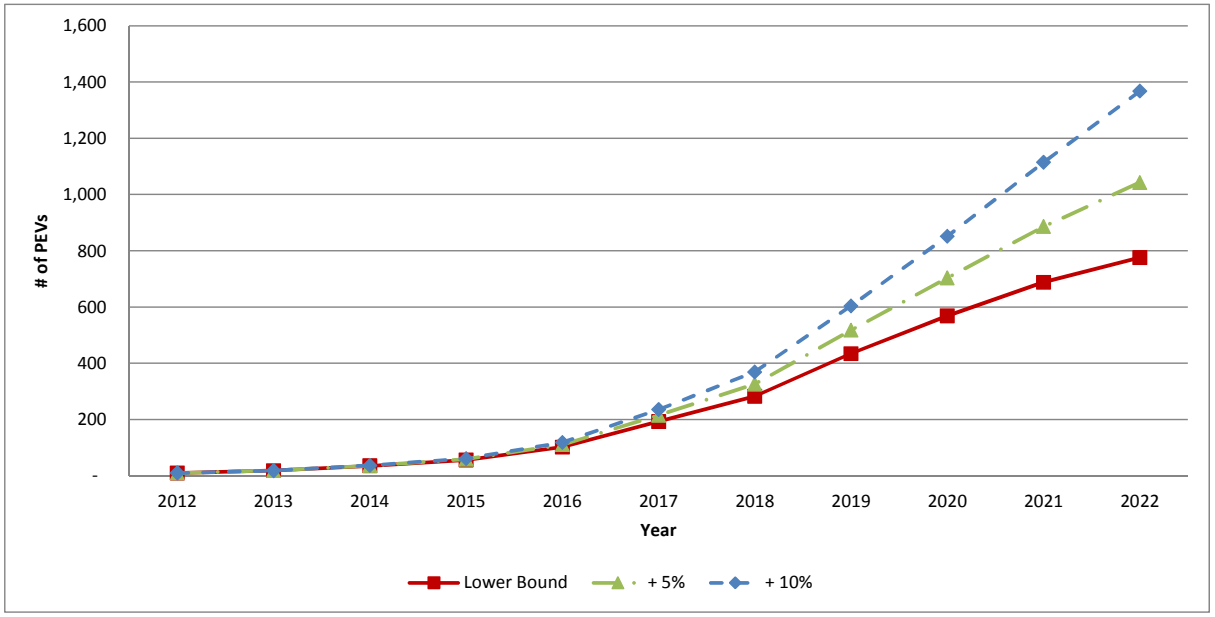


Rancho Cucamonga Municipal Utility

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	9	9	9	65,700	65,700	65,700
2013	18	18	18	131,400	131,400	131,400
2014	35	36	36	253,759	260,329	262,800
2015	55	59	61	403,844	427,316	444,513
2016	101	110	118	740,783	805,204	859,834
2017	192	214	235	1,403,207	1,565,496	1,714,700
2018	282	326	368	2,060,207	2,376,757	2,689,015
2019	434	517	603	3,168,066	3,773,676	4,403,911
2020	569	703	851	4,152,361	5,134,812	6,212,565
2021	688	886	1,114	5,022,132	6,467,113	8,135,132
2022	775	1,043	1,367	5,660,447	7,612,441	9,982,623

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*

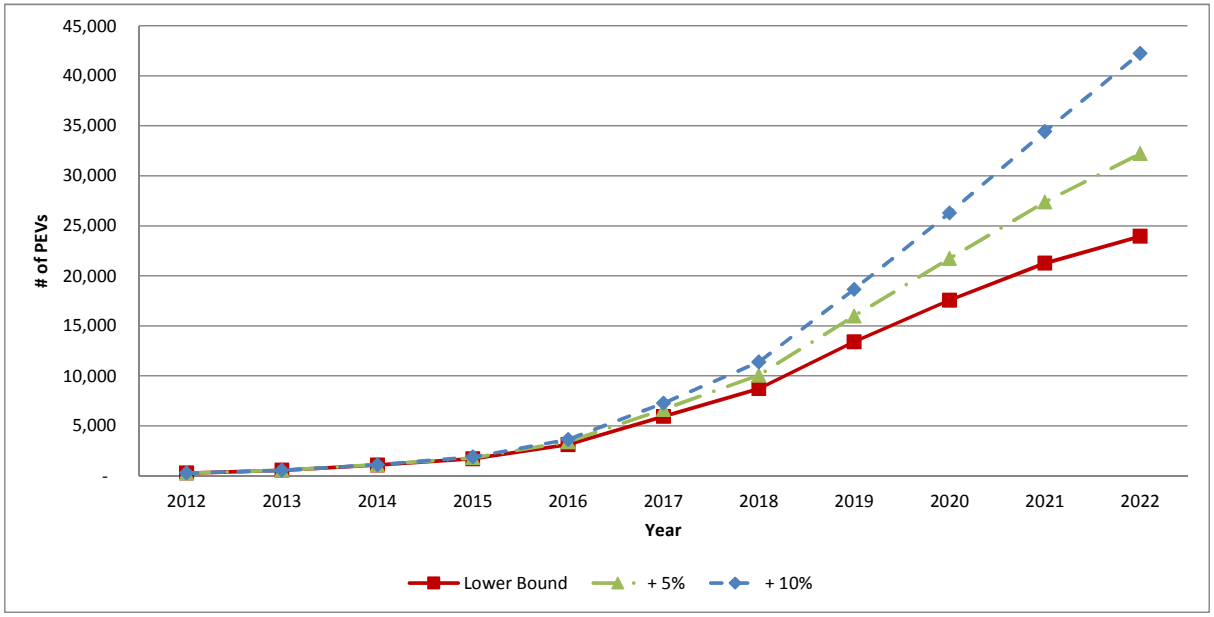


San Diego Gas & Electric[1]

Predicted Cumulative Sales

Year	Number of PEVs*			Total Number of Electric Miles		
	Lower Bound	+ 5%	+ 10%	Lower Bound	+ 5%	+ 10%
2012	278	278	278	2,029,400	2,029,400	2,029,400
2013	556	556	556	4,058,800	4,058,800	4,058,800
2014	1,074	1,102	1,112	7,838,325	8,041,265	8,117,600
2015	1,709	1,808	1,881	12,474,294	13,199,325	13,730,506
2016	3,135	3,407	3,638	22,881,950	24,871,863	26,559,307
2017	5,937	6,624	7,256	43,343,516	48,356,447	52,965,179
2018	8,717	10,057	11,378	63,637,516	73,415,390	83,060,685
2019	13,405	15,968	18,635	97,858,040	116,564,651	136,031,921
2020	17,570	21,727	26,288	128,261,804	158,608,652	191,899,216
2021	21,250	27,365	34,423	155,128,081	199,761,945	251,285,185
2022	23,951	32,211	42,240	174,844,912	235,139,852	308,352,135

** The +5% and +10% projections begin in 2014, when uncertainty becomes greater.*



1 Portion within SCAG