City of Carlsbad Climate Action Plan Annual Report

Reporting Year 2: July 1, 2017 - June 30, 2018

August 2018

City of Carlsbad
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I. Introduction

The purpose of this document is to provide an update on the status of the Climate Action Plan (CAP) implementation that occurred during the current reporting period. The CAP requires that the city annually monitor and report on CAP implementation activities, and present this report to the City Council in a public meeting. Given that CAP implementation is tied to the budget cycle, staff chose the fiscal year calendar to be the reporting period. This Year 2 annual report covers the FY 17-18 reporting period (July 1, 2017 to June 30, 2018).

II. Background on Climate Action Plan

The City of Carlsbad's Climate Action Plan (CAP) was adopted on September 22, 2015, along with the General Plan Update and associated Environmental Impact Report. The purpose of the CAP is to describe how greenhouse gas (GHG) emissions within Carlsbad will be reduced in accordance with statewide targets.

Chapter 2 of the CAP contains information about the 2011 GHG inventory conducted at the time of CAP development. A GHG inventory identifies the major sources and overall magnitude of GHG emissions in the city using standard modeling methods and protocols. Typical inputs include electricity consumed, natural gas consumed, vehicles miles traveled, solid waste disposed, wastewater treated and potable and recycled water used.

Chapter 3 of the CAP contains a discussion of the forecasting used to determine the city's GHG targets for 2020 and 2035, as well as the GHG reductions anticipated by state and federal policies and certain General Plan policies.

Chapter 4 of the CAP describes the additional Measures and Actions that the city must pursue to reach its GHG emissions reduction targets.

To implement these additional Measures and Actions, the city needed to identify and allocate appropriate funding. Therefore, subsequent to CAP adoption, staff contracted with University of San Diego's Energy Policy Initiatives Center (EPIC) to study incremental internal costs to the city for CAP implementation. All of the participating city departments and divisions were surveyed to quantify the resources needed to effectively implement the CAP. On February 23, 2016, staff presented the findings of the study to City Council and noted that these costs would be included in subsequent departmental budget requests. CAP implementation is a team effort involving a number of city departments and divisions, coordinated by the CAP Administrator. The interdepartmental CAP implementation team consists of Public Works (PW) – General Services, PW – Traffic and Mobility, PW – Environmental Management, PW – Utilities, Community and Economic Development – Planning, Parks & Recreation, Finance, City Attorney

and City Manager - Communications. This team meets on an on-going basis to discuss CAP implementation activities and opportunities for collaboration.

The city conducted its first GHG inventory in 2005, which is attached to the CAP as Appendix A. As part of the CAP preparation, the city updated the 2005 inventory and prepared a 2011 inventory. Figure 1 and Table 1 below show the 2011 GHG emissions graphically and in tabular form for the entire city, including emissions from both municipal operations and the community. Municipal operations constituted approximately one percent of all GHG emissions in 2011. Since there are several different types of GHG, GHG emissions are typically expressed in metric tons of carbon dioxide equivalent ($MTCO_2e$) to allow for standardization and comparison.

Figure 1 – 2011 Community GHG Emissions by Sector

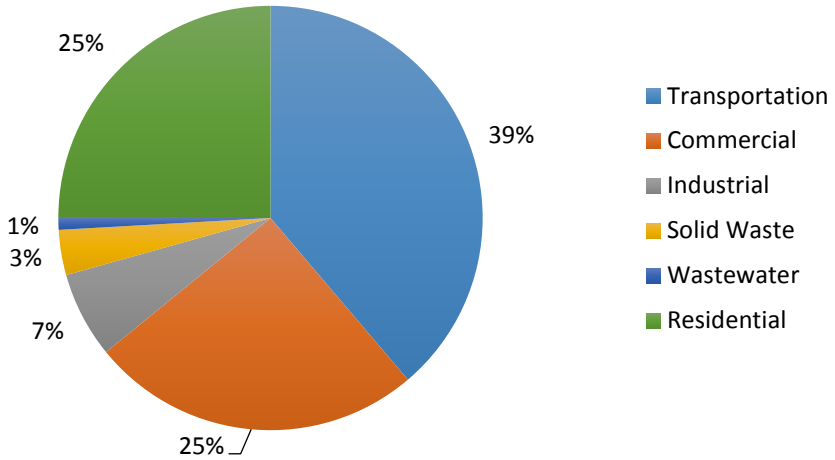


Table 1 – 2011 Community GHG Emissions by Sector

Sector	**GHG Emissions ($MTCO_2e$)**
Residential	176.405
Commercial	178,712
Industrial	46,248
Transportation	273,745
Solid Waste	21,719
Landfill	2,598
Wastewater	6,317
Total	**705,744**

Of the total emissions in 2011, 96 percent are attributed to the residential, commercial, industrial and transportation sectors (e.g. buildings and automobiles). This emissions profile by sector is typical of other cities; therefore, similar to most other CAPs, Carlsbad's CAP focuses primarily on GHG emissions reduction strategies on these sectors.

Forecasts for the Carlsbad CAP were conducted for 2020 and 2035 GHG emissions using the Statewide Energy Efficiency Collaborative (SEEC) model. The CAP used the 2005 inventory as the baseline. The first step in forecasting is to determine what is known as the "Business-As-Usual" (BAU) projection. This projection is the amount of GHG emissions increase anticipated over time due to population and job growth and vehicular traffic levels. The forecast then deducts the anticipated emissions reductions derived from state and federal policies, such as low carbon fuel standards, building energy code requirements and the state's requirement for utilities to provide electricity from renewable energy sources (known as the Renewable Portfolio Standard or RPS).

The Carlsbad CAP considered another category of anticipated GHG emissions reduction from the BAU projections: additional General Plan policies and actions. These policies and actions deal with the transportation sector and include bikeway and pedestrian system improvements, traffic calming, parking facilities and policies, and transportation improvements. After deducting these anticipated GHG emissions reductions from the BAU projection, the model then calculates the amount of additional GHG emissions reductions needed to reach the 2020 and 2035 targets.

The statewide targets used for the CAP are taken from Executive Order S-3-05 (EO S-3-05) and the Global Warming Solutions Act of 2006 (Assembly Bill 32). EO S-3-05 calls for a reduction to 1990 levels by 2020 and 80 percent below 1990 levels by 2050. For Carlsbad, the targets are 15 percent below the 2005 baseline by 2020 and 49 percent below the 2005 baseline by 2035.

The additional GHG emissions reductions necessary to reach the targets are known as the CAP Measures; these measures are noted in Table 2. Each Measure has Actions, which once implemented by the city, will result in the modeled GHG emissions reductions also shown in Table 2.

Table 2 – CAP Measures and GHG Reductions

Measure Letter	GHG Reduction Measures	GHG Reduction in 2020 (MTCO2e)	GHG Reduction in 2035 (MTCO2e)
A	Install residential photovoltaic (PV) systems	2,896	10,136
B	Install commercial and industrial PV systems	3,810	13,336
C	Promote building cogeneration for large commercial and industrial facilities	305	1,067
D	Encourage single-family residential efficiency retrofits	323	1,132
E	Encourage multi-family residential efficiency retrofits	100	351
F	Encourage commercial and city facility efficiency retrofits	5,251	18,377
G	Promote commercial and city facility commissioning, or improving building operations	5,251	18,377
H	Implementation of Green Building Code	51	179
I	Replace Incandescent bulbs with LED bulbs	6,257	21,900
J	New construction residential and commercial solar water heater/heat pump installation and retrofit of existing residential	3,315	11,604
K	Promote Transportation Demand Management	6,728	23,549
L	Increase zero-emissions vehicle travel	15,474	54,158
M	Develop more citywide renewable energy projects	1,309	4,580
N	Reduce the GHG intensity of water supply conveyance, treatment and delivery	1,705	5,968
O	Encourage the installation of greywater and rainwater systems	344	1,205
Total GHG Reductions		**53,199**	**185,919**

III. CAP Measures and Actions

The CAP Measures listed in Table 2 can be grouped into four strategy areas: Energy Efficiency, Renewable Energy, Transportation and Water. For each of the Measures, there are detailed Actions that, taken together, should result in the anticipated GHG emissions reductions. Each of the Actions has an implementation timeframe. Short-term Actions should be completed within the first two years of CAP implementation; mid-term Actions should be completed within five years; and, long-term Actions begin implementation in the first two to five years but will not be completed within that timeframe.

The following section describes the progress made by the city in implementing the CAP measures and actions, organized by the different strategy areas. A more detailed description of activities conducted for each CAP Action, along with the 2035 performance goals for each Measure, is contained in Appendix A of this report. The activities involving public outreach and education are described in a separate section, since those efforts cross over all strategy areas.

A. Energy Efficiency

Energy efficiency is an important component to reducing energy consumption and lowering GHG emissions. The State of California's Energy Commission (CEC) has adopted a "loading order," a prioritized list of actions needed to reduce energy use, and energy efficiency is at the top of the list. For Carlsbad, energy efficiency CAP Measures account for almost a third of the planned GHG emissions reductions.

Measures D, E, F, G, H and I all deal with energy efficiency, both in the community and municipal operations. These Measures call for ordinances mandating energy efficiency improvements in residential and non-residential construction, commissioning of commercial and city facilities, implementation of energy conservation measures in city facilities, and promotion of energy efficiency rebate and incentive programs.

During the reporting period, staff continued to make progress in implementing the energy efficiency related Measures. Using San Diego Gas and Electric's (SDG&E) Emerging Cities Program funds, staff and the Center for Sustainable Energy (CSE) coordinated with the California Statewide Codes and Standards team for preparation of CEC mandated cost–effectiveness studies for the residential and commercial energy efficiency ordinances. PW – General Services upgraded heating, ventilation and air conditioning (HVAC) units at the Senior Center, Carlsbad Municipal Water District (CMWD), City Hall and Faraday Center. Advanced HVAC controls were installed at the Carlsbad City Library and motorized solar controlled shades were installed at the Safety Training Center.

B. Renewable Energy

The provision of energy through distributed renewable sources can significantly reduce the need for electricity from the grid and, therefore, lower GHG emissions. The CEC's loading order prioritization of energy efficiency is to lessen the amount of energy used, thereby minimizing the size and cost of the renewable energy system needed to power the building. According to the CAP, renewable energy Measures will account for about one-fifth of the planned GHG emissions reductions.

Measures A, B, C, J and M relate to community and city renewable energy improvements. These Measures include ordinances requiring PV systems in new residential and non-residential construction and existing commercial buildings, cogeneration in larger non-residential buildings, alternative energy water heating systems, citywide renewable energy projects, and promotion of renewable energy rebate and incentive programs. Cogeneration involves the generation of electricity and another form of energy, such as using steam to provide heating for a building.

During the reporting period, staff contracted with CSE to prepare ordinances related to PV systems and alternative energy water heating. To define the parameters of the PV ordinances, staff used SDG&E interconnect data to plot the actual PV installations relative to the projected and targeted installations contained in the CAP (See Figures 2 and 4 in Section V - Monitoring). With regard to residential PV, the current installations in Carlsbad are already within 204 megawatts (MW) of the 2035 CAP target. Also, the 2019 California Building Code update will require all new residential construction to include PV systems. Therefore, staff concluded that a local ordinance requiring PV on new residential construction was no longer needed. Also during the reporting period, the Microgrid Feasibility Study for the Carlsbad Safety and Service Center complex was completed and presented to City Council on June 12, 2018.

C. Transportation

There are two primary facets of GHG emissions reductions related to transportation. The first is to reduce the number of miles a vehicle is driven. Each mile driven represents an emission of GHG. Reducing the length of trips, or the need to use a motorized vehicle, can significantly reduce GHG emissions. The second facet of transportation-related GHG emissions is to reduce or eliminate the GHG emissions coming from vehicles. Known as low- or zero-emissions vehicles, these automobiles include alternative-fueled vehicles, hybrids and electric vehicles. Taken together, reduction of vehicle miles traveled and tailpipe emissions represents the largest single GHG emissions reduction strategy area. In the Carlsbad CAP, transportation-related Measures total over 40 percent of the planned GHG emissions reductions.

Measures K and L address the transportation related GHG emissions reductions. Measure K relates to reducing vehicle miles traveled and is closely tied to the policies contained in the

General Plan Mobility Element. During the reporting period, staff worked with a consultant to complete major portions of a TDM plan and website. Staff also conducted activities to promote TDM campaigns and rideshare and carpool organizations, demonstrated electric bicycle use, and installed bike racks.

Measure L involves reducing tailpipe emissions through an increase in the proportion of low- and zero-emission vehicles on the road. Some of the Actions in Measure L involve ordinance development, which is coupled with the ordinances being developed in the Renewable Energy strategy area. Other activities during the reporting period included initiation of a draft fleet replacement program and activation of publicly available electric vehicle charging stations at State Street parking lot, Stagecoach Park, and Pine Avenue Park Community Center.

D. Water

Water conservation can lower GHG emissions because movement of water and wastewater requires energy. Measures N and O promote increasing energy efficiency in the potable water, recycled water and wastewater conveyance systems and using greywater and rainwater collection systems.

The CMWD analyzes energy usage of their pumps and endeavors to increase energy efficiency of equipment whenever it is replaced. During the reporting period, several sewer pumps and a power generator were replaced with higher efficiency units. Implementation of the Actions associated with Measures N and O will continue in the mid- to long-term timeframe.

E. Public Outreach and Education

In addition to the provision of energy-efficient buildings or the availability of PV systems and electric vehicles, a critical component to reducing GHG emissions is encouraging members of the public to engage in behaviors that reduce GHG emissions. Bike lanes, pedestrian improvements and transit expansion only reduce GHG emissions if people use them.

Measures C, D, E, F, G, and I all contain Actions related to public outreach and education. During the reporting period, staff continued work on a multi-year, research-based strategy to achieve measurable changes in public behavior, resulting in reduced GHG emissions. Based on research to date, staff is focusing on mobility choices and home energy efficiency. Concurrent with the long-term strategy, staff implemented several short-term public outreach and education tactics focused on reducing vehicle-miles traveled, water conservation, energy saving, solar energy, electric vehicles and rebate programs. This included:

- Social media (organic and paid)
- Print advertising
- Articles in Carlsbad Currents, delivered to every Carlsbad household
- Article in School News, delivered to families in the Carlsbad Unified School District

- Article in Carlsbad Business Journal
- News releases promoting GHG reduction measures and environmental events in local media
- Informational materials available at city facilities.
- A website with information and resources
- Participation in the Carlsbad Chamber of Commerce Green Business Expo.
- Presentations at local, regional and statewide meetings, including the City of Carlsbad Planning Commission and City Council, SDG&E Local Government Partners Quarterly meeting, Zero Net Energy for Local Governments workshop, and the SEEC Forum.

IV. New Development Projects

The CAP serves as an environmental review tiering document pursuant to Section 15183.5 of the State California Environmental Quality Act (CEQA) Guidelines. According to the CAP, any discretionary project that will have GHG emissions greater than 900 $MTCO_2e$ must either demonstrate consistency with the CAP or submit a project-specific GHG analysis for review and approval.

During the reporting period, the Planning Division continued to implement the Climate Action Plan Consistency Checklist and accompanying Guidance for Demonstrating Consistency with the Climate Action Plan – For Discretionary Projects Subject to CEQA. The Checklist and Guidelines are available at: http://www.carlsbadca.gov/services/building/forms/default.asp.

Two projects underwent CAP compliance review and were approved during the reporting period:

Carlsbad Oaks North Lot 24

- Installation of a 221.20 kW solar photovoltaic (PV) system, or about 737 – 300 Watt panels.
- 75 percent of project luminaires are LED or equivalent energy efficiency.
- 22 dedicated electric vehicle (EV) parking spaces, 11 of which will include EV charging equipment.
- Development and implementation of a transportation demand management (TDM) plan.
- Natural gas service water heaters with a minimum 95 percent thermal efficiency.

Pacific Vista Commerce Center Lot 23

- Installation of at least a 910 kW solar photovoltaic (PV) system.
- 75 percent of project luminaires are LED or equivalent energy efficiency.
- 44 dedicated electric vehicle (EV) parking spaces, 22 of which will include EV charging equipment.

- Development and implementation of a transportation demand management (TDM) plan.
- Natural gas service water heaters with a minimum 95 percent thermal efficiency, or a solar water heating system which provides at least 50 percent of total energy required for water heating.

V. Monitoring

Monitoring of CAP implementation can be divided into three general areas: 1) progress on implementing the CAP Actions; 2) progress on reaching the CAP Measures' performance goals; and, 3) progress in reaching the CAP GHG emissions reductions targets for 2020 and 2035.

A detailed description of the activities undertaken to implement the CAP Actions is contained in Appendix A. Regarding the CAP Measures and their corresponding performance goals, there is variability in the monitoring data sources. For example, monitoring for Measures D, E, F and G require SDG&E electric and natural gas energy usage. Monitoring for Measure L requires vehicle miles traveled (VMT) model output data. The energy usage and VMT data will be collected during the biannual GHG inventory process, conducted by SANDAG, and reported in the corresponding CAP Annual Report.

A. Renewable Energy

Measures A and B involve increasing the amount of residential and non-residential solar PV systems in Carlsbad. Data for PV installations is available from California Distributed Generation Statistics Net Energy Metering (NEM) Currently Interconnected Data Set website and SDG&E. While these data are a source of PV system size, they do not contain accurate locational information. The trend and current amount of residential PV systems is shown in Figure 2. As stated in Section III.B, the amount of residential solar PV energy generation is very close to the CAP's 2035 performance goal of 25 MW.

Figure 2 - Residential PV Installations and CAP Projections and Target

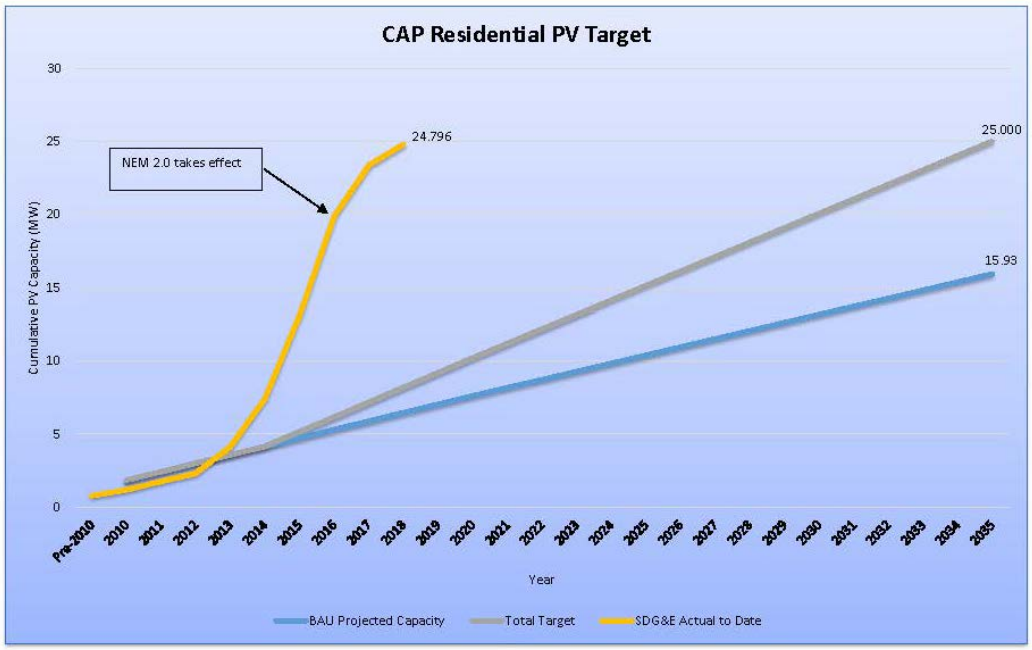


Figure 3 shows the location within Carlsbad of the PV systems installed between March 2011 and July 2018, as derived from the city's EnerGov building permit database. Prior to March 2011, the city's permit types did not discern between PV installations and other electrical permits; therefore, locational data from prior years is not available. Even though the city has almost reached its 2035 performance goal for residential PV installations, the information in Figure 3 is useful for tracking locations of PV systems and perhaps targeting outreach and education efforts to encourage more solar power in the city.

Figure 3 – Location of Residential PV Installations March 2011 – July 2018

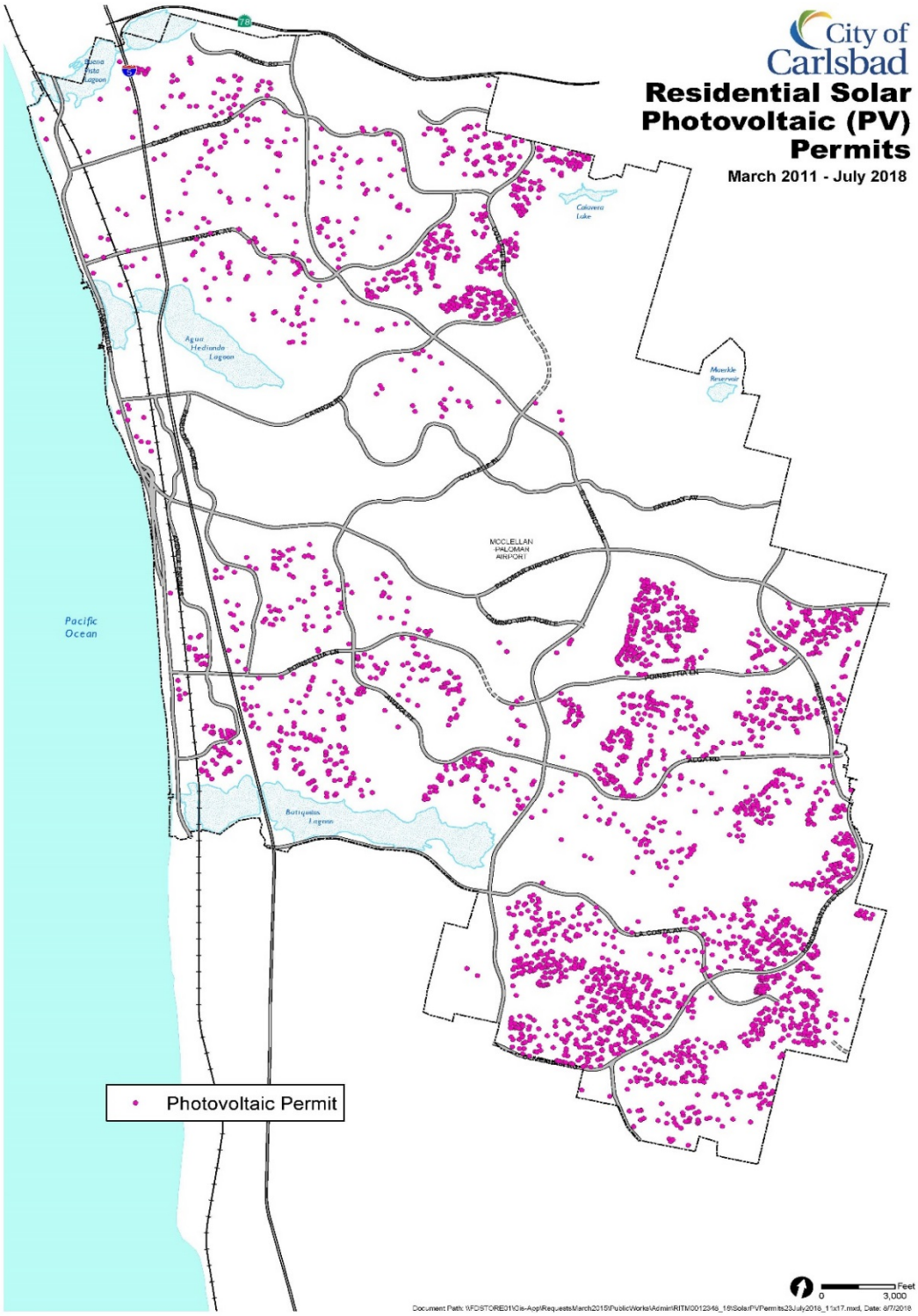


Figure 4 – Non-residential PV Installations and CAP Projections and Target

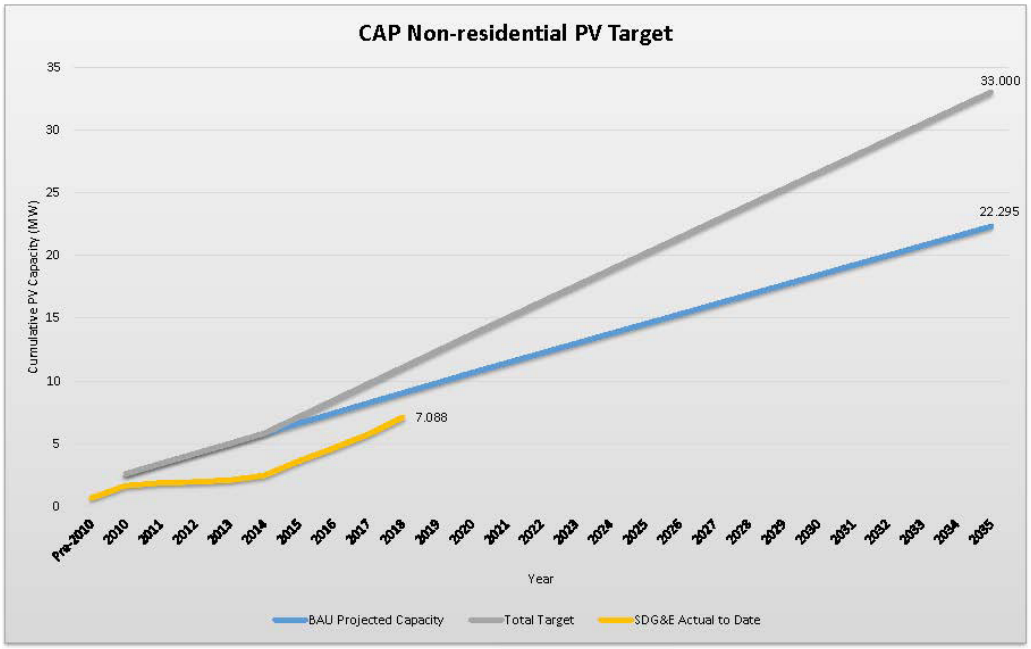


Figure 4 shows the non-residential PV installations within Carlsbad. The trend is currently below the CAP projections. Implementation of CAP Measure B is intended to increase this trend to the CAP target.

B. Electric Vehicles

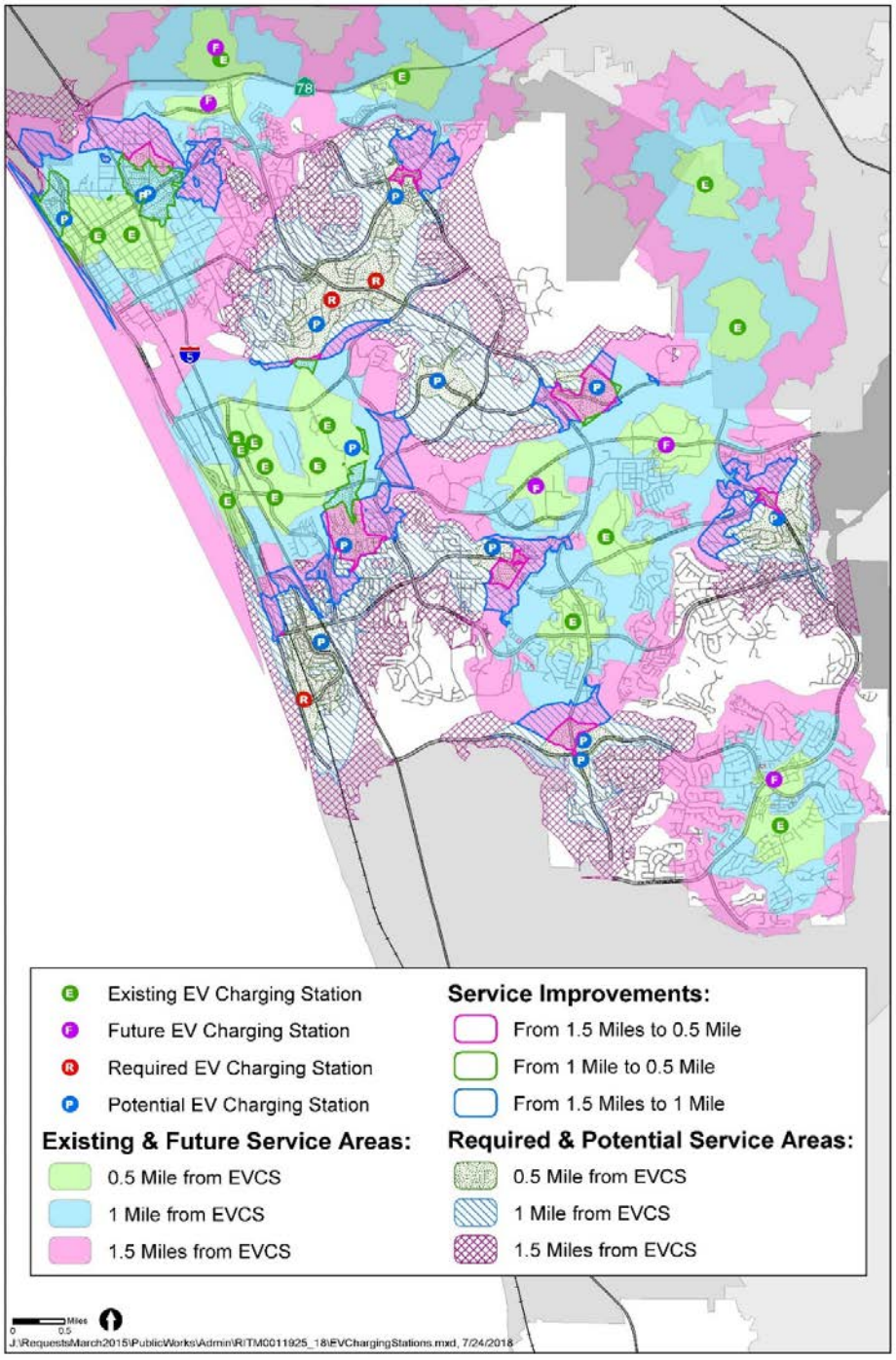
CAP Measure L involves promoting an increase in the proportion of zero-emission vehicle (ZEV) miles traveled, specifically electric vehicles (EV), of the total VMT. One way to promote an increase in EV ownership and use is to increase the number and locations of publicly available EV charging stations.

Figure 5 shows the results of the EV charging station mapping analysis conducted during the reporting period. The study mapped the existing (E) and future (F) sites and plotted polygons indicating driving distances to these sites (defined as "service areas"). The California Building Code requires that new commercial development dedicate EV parking stalls and install the electrical infrastructure needed to serve those stalls. Currently, development projects within Carlsbad that are subject to environmental review are required to activate 50 percent of those state-mandated EV parking stalls, making them available for public charging upon building occupancy. The location of these required (R) sites was also plotted.

The most practical locations for public EV charging locations are publicly accessible parking lots, such as those at commercial sites and city-owned public properties. Therefore, staff analyzed

the locations of these sites relative to the E, F and R locations and identified sites that would increase and/or improve the EV charging service areas. These locations are designated as potential (P) EV charging sites.

Figure 5 – Electric Vehicle Charging Station Service Areas



C. Transportation General Plan Policies

In addition to the CAP Measures and Actions described in Section III, the CAP also relies upon implementation of some transportation related General Plan policies for GHG reductions. These policies involve bikeway system improvements, pedestrian improvements and increased connectivity, traffic calming, parking facilities and policies, and transportation improvements. While the overall GHG reduction of these General Plan policies is relatively small (less than 4.5 percent of 2035 reductions) it is important to track progress in completing these improvements because they contribute increased and multimodal mobility within the city.

Bikeway and Pedestrian System Improvements

There were several improvements to the bikeway and pedestrian system during the reporting period. Major projects included:

2017 Pavement Overlay **-** Added a three-foot buffer to existing bike lanes on both sides along El Camino Real from Gateway Road to Arenal Road

2017-18 Slurry Seal

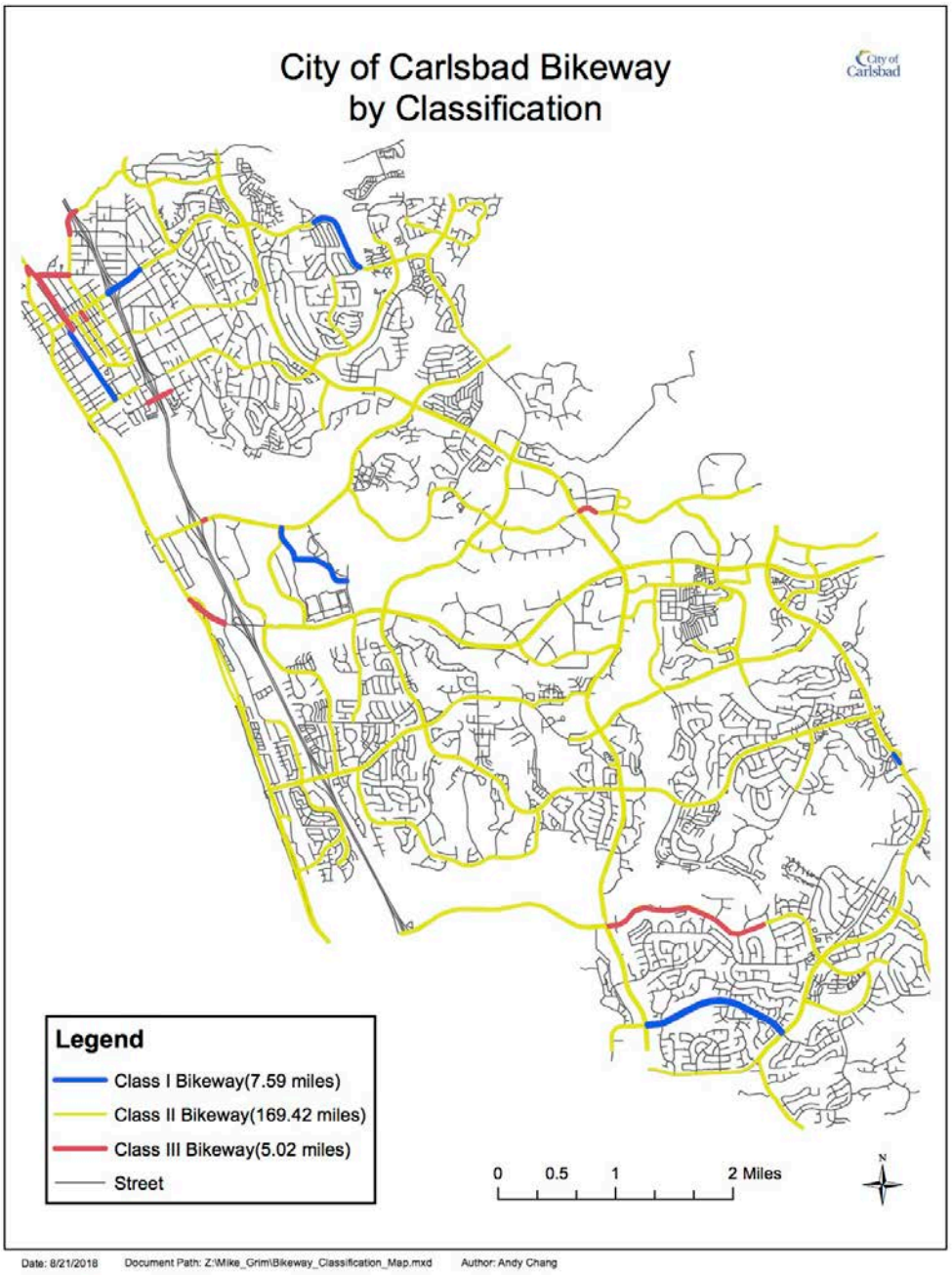
- Installed new bike lanes on both sides of Rancho Bravado from Paseo Valindo to Paseo Monona.
- Installed new bike lanes on both sides of El Fuerte Street from Babilonia Street to Corintia Street.
- Added a three-foot buffer to existing bike lanes on both sides along Melrose Drive from Palomar Airport Road to Rancho Santa Fe Road.
- Added a three-foot buffer to existing bike lanes on both sides along Rancho Santa Fe Road from Melrose Drive to La Costa Avenue.

ADA Improvement Program **-** Replaced over 100 non-compliant curb ramps in The Village. The new ADA compliant curb ramps included gentler slopes, as well as the required truncated domes.

2017 Concrete Replacement - Replaced 562 linear feet (or 12,400 square feet) of broken or uplifted sidewalk and replaced four non-compliant and damaged curb ramps.

The city currently has 182.03 miles of bikeways, as shown in Figure 6. The current amount of bikeways will be used as a baseline to track additions and enhancements.

Figure 6 – Bikeways by Classification



Parking Facilities and Policies

On Sept. 26, 2017, the City Council accepted a Parking Management Plan (PMP) for the Carlsbad Village, Barrio and Beach Area, which contains many of the parking policies described in the CAP. Implementation of the plan will occur through the Carlsbad Village and Barrio Master Plan (adopted by City Council on July 24, 2018). The recommendations in the PMP include hiring a parking program management program manager, incentivizing shared and leased parking, reducing parking requirements, allowing bicycle parking as a replacement for required parking, and installing digital parking locator infrastructure and wayfinding signs.

Transportation Improvements

During the reporting period, staff worked closely with NCTD to evaluate current ridership on buses, the coaster, and transfers from the Transit Center. NCTD contributed to the development of the city's Trolley Feasibility Study and Transit Master Plan to help facilitate the first and last mile of the transit trip.

VI. GHG Emissions Inventory and Forecast

During the reporting period, staff completed a community GHG emissions inventory for 2012 and 2014 and an updated 2020 forecast. The purpose of the effort was to identify the GHG emission trends prior to CAP adoption and see if the emissions reduction were still on track to reach the 2020 GHG target defined in the CAP. To allow for a direct comparison with the 2005 and 2011 inventories contained in the CAP, staff employed the same methodology and protocols used for those inventories. Figure 7 shows the results of those inventories and indicates a downward trend from the peak in 2012. It also shows that GHG emissions in 2014 are lower than those in 2011.

Figure 7 – Community GHG Inventories 2005-2014

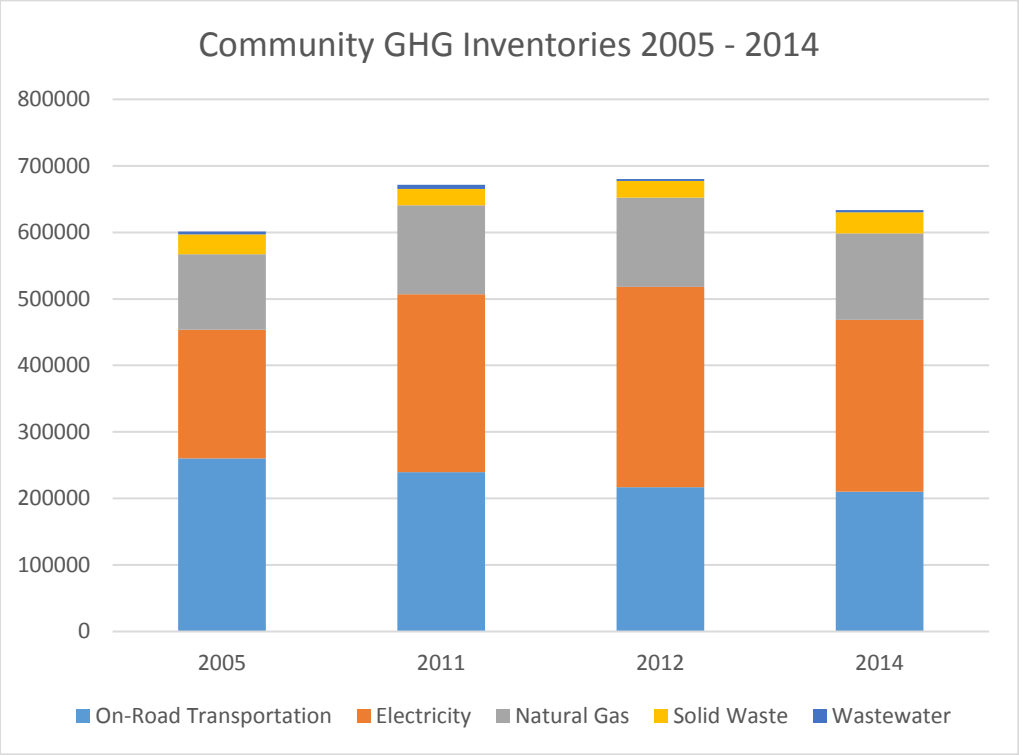
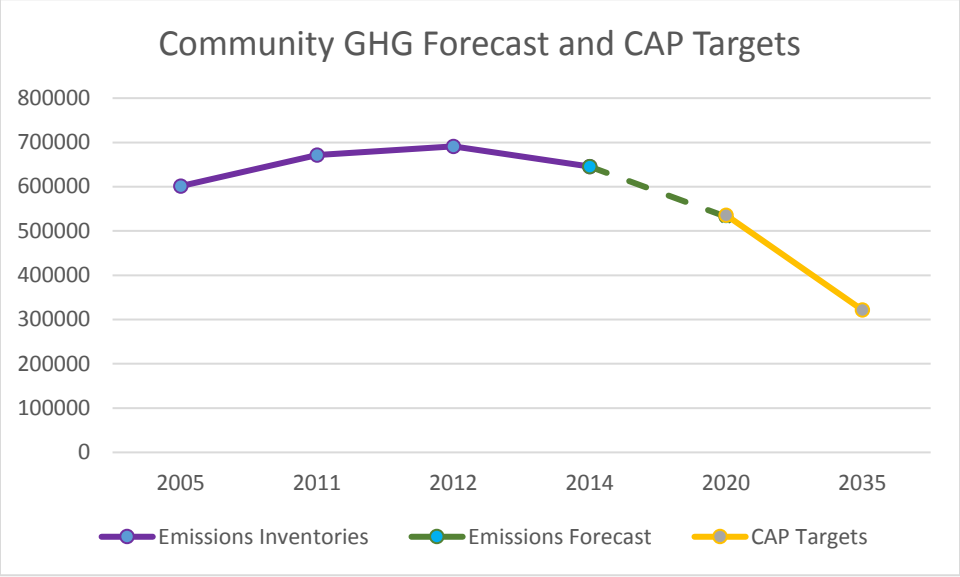


Figure 8 plots the four inventories and updated 2020 forecast and indicates the city will meet the 2020 GHG target defined in the CAP.

Figure 8– Community GHG Forecast and CAP Targets



During the reporting period, SANDAG adopted the Regional Climate Action Planning Framework (ReCAP), which recommends regionally consistent approaches, methodologies, and data sources for GHG inventories and forecasts. Also, through SANDAG's Regional Climate Planning Services, the city will be receiving a 2016 GHG inventory and forecast using the updated methodology and protocols established in the ReCAP. Staff will use the results of the 2016 inventory and forecast to evaluate progress towards reaching the CAP GHG targets, evaluate current CAP Measures and Actions and make recommendations on CAP updates if needed.

VII. Summary

During the second year of CAP implementation, staff continued to make progress in establishing an administrative structure and carrying out the CAP Measures and Actions. During the next fiscal and reporting year, staff will continue to work and coordinate with consultants, SANDAG, SDG&E and other regional and business partners to further CAP implementation and continue to lower GHG emissions.

Appendix A

FY 17-18 CAP Implementation Activities

by Measures and Actions

CAP Measures and Actions **2035 Performance Goals for Measures**		**FY 17-18 CAP Implementation Activities by Measures and Actions**
Timeframes in CAP: *Short-term = 1 - 2 years* *Mid-term = 2 - 5 years* *Short to Long-term & Mid-Long-term = begun but not completed in 5 years*		
A - Promote installation of residential photovoltaic systems Promote installation of residential PV systems to produce an additional 9.1 MW above already projected amounts, or the equivalent of 2,682 more homes with PV systems, by 2035.		
A-1	Temporarily - for a period of one year - suspend residential and commercial PV system permit fees, together with a publicity campaign to promote PV systems installation. *(Short-term)*	This action was deemed unnecessary due to the already increasing volume of residential and commercial PV permits. Permit fees for Carlsbad are proportionate or lower than fees in other San Diego region jurisdictions. In 2015, City Council adopted Ord. CS-285, which streamlined the permitting process for small residential rooftop solar energy systems.
A-2	On a continuing basis, ensure that regulatory provisions - such as complying with regulations for zoning, structure height, permit submittal and review, etc. - do not hinder residential and commercial PV system installation. *(Short to Long-term)*	Staff will continue to evaluate the zoning regulations and permitting process to ensure there is no hindrance of PV installations.
A-3	Adopt an ordinance, similar to those passed by Lancaster and Sebastopol, which requires new homes to install PV panels to offset a portion of their energy use. *(Short-term)*	Staff contracted with Center for Sustainable Energy (CSE) and initiated work in October 2017. Tasks completed include background research of other city ordinances and requirements, evaluation of cost-effectiveness studies of local residential PV ordinances, and monitoring and outcome of proposed statewide residential solar PV requirement.
B - Promote installation of commercial and industrial photovoltaic systems Promote installation of commercial and industrial PV systems to produce an additional 10.7 MW above projected amounts, or roughly 15 percent of projected commercial and industrial electricity use.		
B-1	Adopt a commercial energy conservation ordinance requiring all new nonresidential developments with more than 50 cars surface parked or on roofs of parking structures to use PV panels over at least half of the surface/roof-parked cars, or provide equivalent energy conservation/generation by other means (over and above other requirements). *(Short-term)*	Staff contracted with CSE and initiated work in October 2017, conducted background research of other city ordinances and requirements. Preparation of parameters and building prototyping for cost-effectiveness studies underway.

B-2	Adopt an ordinance requiring existing nonresidential developments to install PV panels to offset a portion of their energy use. *(Mid-term)*	Staff contracted with CSE and initiated work in October 2017, conducted background research of other city ordinances and requirements. Preparation of parameters and building prototyping for cost-effectiveness studies underway.
C - Promote building cogeneration for large commercial and industrial facilities Promote building cogeneration for large commercial and industrial facilities, with the goal of producing 6.9 MW by 2035.		
C-1	Promote cogeneration by publicizing grant opportunities and financial incentives, such as the Self-Generation Incentive Program and feed in tariffs for cogeneration systems, for renovations of existing buildings by posting these on the city's website and by other means. *(Short-term)*	Staff maintained a website to promote existing programs such as the Self-Generation Incentive Program.
C-2	Install cogeneration systems on all city facilities that can benefit from the installation of these systems, and apply for funding through the Energy Efficiency Financing for Public Sector Projects program, or other similar funding sources. *(Mid to Long-term)*	Staff evaluated the effectiveness of cogeneration systems on city facilities and no facilities met the minimum criteria needed for useful cogeneration.
C-3	Require cogeneration systems for large commercial and industrial facilities that have on-site electricity production, both for new construction and retrofits. *(Mid-term)*	Staff is assessing the types of projects that could be subject to this Action, both existing and in the future.
D - Encourage single-family residential efficiency retrofits Encourage single-family retrofits with the goal of 50 percent energy reduction compared to baseline in 30 percent of the total single-family homes citywide (approximately 10,000 single-family homes out of total of 35,000.)		
D-1	Publicize available incentive and rebate programs, such as SDG&E's Residential Energy Efficiency Program, on the city's website and by other means. *(Short-term)*	Staff maintained a website, made community presentations, and published articles in newsletters and newspapers.
D-2	Create a citywide "Energy Challenge," similar to the Department of Energy's Better Buildings Challenge, to promote cost-effective energy improvements, while having residents and building owners commit to reducing energy consumption. *(Short-term)*	Staff continued work on a multi-year, research-based strategy to achieve measurable changes in public behavior, resulting in reduced GHG emissions. A program such as this could become part of that strategy, based on the findings of research being conducted.

D-3	Adopt a residential energy conservation ordinance, which requires residential property owners to conduct and disclose an energy audit at the time of major renovations (as defined by the ordinance,) to ensure that homes and residential developments meet specified low cost energy efficiency measures - such as requisite ceiling insulation, insulated pipes, water heater blankets and exterior door stripping. *(Short-term)*	Using SDG&E's Emerging Cities Program funds, staff continued to work with CSE to develop a residential energy efficiency ordinance, as well as a related public outreach and involvement program. Also working on the project is the California Statewide Codes and Standards team, who sponsored the preparation of the cost-effectiveness study required by the California Energy Commission (CEC) for all reach codes. The results of the study show very few energy efficiency measures to be cost-effective in Title 24 Climate Zone 7. The CEC also indicated that the energy audit would need to be shown as cost-effective, which is not possible since the results may indicate no energy efficiency improvements are necessary. Staff is reevaluating the ordinance structure and content.
E - Encourage multi-family residential efficiency retrofits Encourage multi-family retrofits with the goal of 50 percent energy reduction compared to baseline in 30 percent of the total multi-family homes citywide (approximately 5,000 single-family homes out of total of 17,000.)		
E-1	See D-1 above	See D-1 above
E-2	See D-2 above	See D-2 above
E-3	See D-3 above	See D-3 above
F - Encourage commercial and city facility efficiency retrofits Encourage commercial and city facility efficiency retrofits with the goal equivalent to a 40 percent energy reduction in 30 percent of commercial square footage citywide and in city-owned buildings by 2035.		
F-1	Undertake a program of energy efficiency retrofits for city-owned buildings, with the goal of 40 percent reduction in energy use, beginning with retrofits that would result in most substantial energy savings. *(Short-term)*	Staff replaced heating, ventilation and air conditioning (HVAC) units the Senior Center, Carlsbad Municipal Water District and Faraday Center, each resulting in a 29 percent reduction in energy usage. Staff also replaced the HVAC system at City Hall and the air handler at the Senior Center fitness room. Advanced HVAC controls were incorporated into the system at the Carlsbad City Library. At Fire Station No. 1, existing single pane windows were replace with dual pane. At the Safety Training Center, motorized and solar controlled solar shades were installed for all of the upstairs west-facing windows to reduce energy costs during the summer months and afternoon hours. The Microgrid Feasibility Study, accepted by City Council on June 12, 2018, identified possible future energy conservation measures at the Safety Center, Fire Station #5 and the Fleet Maintenance Center.

F-2	Promote available incentive and rebate programs, such as SDG&E's Energy Efficiency Business Rebates and Incentives Program, on the city's website and by other means. *(Short-term)*	Staff maintained a website and published an article in the Carlsbad Business Journal.
F-3	Adopt a commercial energy conservation ordinance, which requires property owners to ensure that commercial buildings meet specified energy efficiency measures - such as requisite heating, ventilation, and air conditioning improvements, service water system requirements, and improved refrigeration equipment, at time of conducting major renovations (as defined by the ordinance). *(Short-term)*	Using SDG&E's Emerging Cities Program funds, staff continued to work with CSE to develop a commercial energy efficiency ordinance, as well as a related public outreach program. Also working on the project is the California Statewide Codes and Standards team, who sponsored the preparation of the cost-effectiveness study required by the CEC for all reach codes. As of June 30, 2018, the cost-effectiveness study was not completed.
G - Promote commercial and city facility commissioning Encourage commercial and city facility commissioning, or improving existing and new building operations, with the goal equivalent to a 40 percent energy reduction in 30 percent of commercial square footage citywide and in city-owned buildings by 2035.		
G-1	Promote commercial commissioning programs on the city's website such as San Diego RCx, and similar programs for commercial buildings. *(Short-term)*	Staff maintained a website to promote these programs.
G-2	Commission city facilities to improve building operations and reduce energy costs, with a goal of 40 percent energy reduction in 30 percent of city facility square footage. *(Mid-term)*	The city is participating in SANDAG's Energy Roadmap program, which provides energy audits of city facilities and recommends possible energy conservation measures.
H - Implement green building measures Implementation of a five percent improvement in energy efficiency above the City of Carlsbad residential green building code (based on CALGreen, the statewide green building code), for new construction.		
H-1	Adopt residential and commercial energy conservation ordinances requiring a five percent improvement in energy efficiency for residential and nonresidential new construction, above the existing City or Carlsbad green building code. *(Short-term)*	At the time of CAP adoption, the City of Carlsbad was requiring compliance with 2013 version of CalGreen. On June 27, 2017, the city adopted the 2016 version of CalGreen, which significantly increases energy efficiency of newly constructed buildings, far beyond the five percent called for in Action H-1. For example, single family homes constructed under the 2016 standards will use about 28 percent less energy for lighting, heating, cooling, ventilation, and water heating than those built to the 2013 standards

I - Promote replacement of incandescent and halogen bulbs with LED or other energy efficient lamps Replace 50 percent of incandescent and halogen light bulbs citywide with LED or similarly efficient lighting by 2035.		
I-1	Replace 50 percent of incandescent or halogen light bulbs in city facilities with LED or similarly efficient lighting, or follow SANDAG Energy Roadmap recommendations for lighting in city facilities, whichever results in greater energy savings. *(Short-term)*	No significant lighting replacement projects occurred during the reporting period.
I-2	Promote the use of LED or other energy efficient lamps by publicizing rebate programs and information from SDG&E on the benefits of the use of LED or other energy efficient lighting on the city's webpage. *(Short-term)*	Staff maintained a website, made community presentations, and published articles in newsletters and newspapers.
I-3.i	Evaluate the feasibility of adopting a minimum natural lighting and ventilation standard, developed based on local conditions. *(Mid-term)*	Staff contracted with CSE and initiated work in October 2017 to perform a qualitative feasibility evaluation for natural lighting and ventilation.
I-3.ii	Demonstrate natural lighting and ventilation features in future facility upgrade or new construction. *(Mid-term)*	Staff is evaluating potential future city projects to demonstrate natural lighting and ventilation.
J - New construction residential and commercial solar water heater/heat pump installation & retrofit of existing residential Install solar water heaters or heat pumps on all new residential and commercial construction. Retrofit up to 30 percent of existing homes and commercial buildings to include solar water heaters or heat pumps.		
J-1	Promote the installation of residential solar water heaters and heat pumps by publicizing incentive, rebate and financing programs, such as PACE programs and the California Solar Initiative for renovations of existing buildings by posting this information on the city's website and by other means. *(Short-term)*	Staff maintained a website, made community presentations, and published articles in newsletters and newspapers.

J-2	Adopt residential and commercial energy conservation ordinances requiring new residential and commercial buildings to install solar water heaters or heat pumps, or use alternative energy (such as PV-generated electricity) for water heating needs. *(Short-term)*	Staff contracted with CSE and initiated work in October 2017, conducted background research of other city ordinances and requirements. Preparation of parameters and building prototyping for cost-effectiveness studies underway.
K - Promote transportation demand management strategies Promote Transportation Demand Management Strategies with a goal of achieving a 10 percent increase in alternative mode use by workers in Carlsbad, for a total of 32 percent alternative mode use.		
K-1	Adopt a citywide transportation demand management (TDM) plan, as described in the General Plan Mobility Element, detailing a mix of strategies to reduce travel demand, specifically of single occupancy vehicles. SANDAG's 2012 "Integrating Transportation Demand Management Into the Planning and Development Process" provides a guide to designing and implementing a TDM plan and will be used as a reference document to develop the city's TDM plan. TDM strategies evaluated in the plan include parking ordinances, subsidized or discounted transit programs, transit marketing and promotion, carsharing, parking pricing, and bike parking. *(Short-term)*	The TDM effort is an integral part of a larger Sustainable Mobility Plan (SMP), partially funded through a Sustainable Communities grant from Caltrans. During the reporting period, staff and the consultant completed the existing conditions and infrastructure assessments and the education, programs and services section of the plan. Staff and a consultant worked on developing the TDM website content. Staff also conducted the following activities: • Promotion of local TDM campaigns such as Rideshare Month, Bike to Work Day, and the Guaranteed Ride Home program. • Hosted onsite marketing events for Waze Carpool, Uber & Lyft, as well as electric bike demos and facilitated group rides. • Installed new bike racks and provided bike repair kits to any employee in need. • Participated in several CAP events to further their understanding of the CAP and its' implications on TDM.

K-2	Adopt a TDM ordinance, defining a minimum trip generation threshold for nonresidential development projects. The city will set performance requirements for minimum alternative mode use based on project type. All projects above the threshold shall submit a TDM plan, which includes a description of how the minimum alternative mode use will be achieved and maintained over the life of the project. Potential TDM trip reduction measures can include carpool and vanpool ridematching services; designated employees as contacts for trip reduction programs; providing a direct route to transit in coordination with NCTD; developing public-private transit partnerships; passenger loading zones; pedestrian connections; showers and clothes lockers; long–term bicycle parking and shuttle programs. (Mid-term)	The draft TDM ordinance was prepared and is in internal review.
L - Promote an increase in the amount of zero-emissions vehicle travel Promote an increase in the amount of zero-emissions vehicle (ZEV) miles traveled from a projected 15 percent to 25 percent of total vehicle miles traveled (VMT) by 2035.		
L-1	Working with industry partners, construct a “PV to EV” pilot project to install a PV charging station at a city facility (such as Faraday Center) to charge city ZEVs. The purpose of the pilot project would be to evaluate the feasibility of incorporating more ZEV into the city's fleet. *(Short-term)*	Staff is reviewing potential location(s) for the "PV to EV" pilot project(s).
L-2	Prepare a community-wide charging station siting plan, which evaluates site visibility and exposure, electric vehicle (EV) driving ranges, high volume destinations, locations with high ownership or interest in EVs, and cost of construction. *(Short-term)*	Staff prepared a mapping and travel distance analysis of existing and future EV charging sites and identified gaps in service areas. The locations of city-owned public properties and commercial centers that do not currently have EV charging infrastructure were then evaluated as to their ability to fill those gaps. The results of that mapping analysis is contained in Section V of the annual report.
L-3	Construct ZEV charging stations based on the community-wide charging station siting plan described in L-2 above. The ZEV charging stations will be funded by grant funds when available, and the city will post signage directing ZEVs to charging stations. *(Mid-term)*	The two EVgo electric vehicle charging stations at State Street parking lot (2 vehicles) and Stagecoach Park (10 vehicles) were installed. The city purchased charging pedestals and contracted for subscription service from ChargePoint. A two vehicle ChargePoint charging stations was also installed at Pine Avenue Park Community Center. Staff will use the results of the EV charging mapping analysis to consider EV charging infrastructure at city-owned locations and encourage private property owners to install EV charging infrastructure on their properties.

L-4	Offer dedicated ZEV parking, and provide charging stations adjacent to ZEV parking as identified in the community-wide charging station siting plan. *(Mid-term)*	Staff contracted with CSE and initiated work in October 2017, conducted background research of other city's electric vehicle infrastructure requirements. Preparation for Carlsbad cost-effectiveness studies underway.
L-5	Adopt requirements for ZEV parking for new developments. *(Short-term)*	Staff contracted with CSE and initiated work in October 2017, conducted background research of other city's electric vehicle infrastructure requirements. Preparation for Carlsbad cost-effectiveness studies underway.
L-6	Adopt a residential energy conservation ordinance, similar to Palo Alto, requiring the installation of EV chargers or pre-wiring in new residential construction and major renovations. *(Short-term)*	The 2016 Green Building Standards Code requires all new one and two family homes to have electrical capacity, circuitry, conduit and receptacles to allow for installation of EV charging equipment. All new multi-family projects with 17 or more dwelling must make similar provisions for three percent of parking required. To further encourage ZEV use, a local ordinance could require installation of charging equipment for some portion of a project's parking.
L-7	Update the city's Fleet Management Program to include a low and zero-emissions vehicle replacement/purchasing policy. Increase the proportion of city fleet low and zero–emissions VMT to 25 percent of all city-related VMT by 2035. *(Short-term)*	The city also began preparation of a fleet conversion plan intended to transition the existing fleet of gas powered pool vehicles to low and ZEV.
M - Develop more citywide renewable energy projects Produce an equivalent amount of energy to power 2,000 homes (roughly equivalent to a five percent reduction) by 2035 from renewable energy projects.		
M-1	Conduct a feasibility study to evaluate citywide renewable energy projects and prioritize accordingly. *(Short-term)*	Leveraging SANDAG's Energy Engineering contract with TRC, a Microgrid Feasibility Study for the Carlsbad Safety and Service Center on Orion Way was completed and presented to City Council on June 12, 2018. If implemented, the microgrid would include enough renewable energy generation and energy storage to power the entire complex in case of a blackout.
M-2	Incorporate renewable energy measures such as PV system installation on city buildings and parking lots, or microturbine installation on city facilities, with the goal of producing approximately 12,000 megawatt-hours per year. *(Mid to Long-term)*	Construction of the Pine Avenue Park Community Center incorporated PV systems. Future city facilities will also be required to incorporate renewable energy.

M-3	Pursue available funding sources for the construction of renewable energy projects by the city, such as Energy Efficiency Financing for Public Sector Projects and SGIP. *(Mid to Long-term)*	Funding sources to support CAP implementation, including renewable energy projects, will be a component of the upcoming CAP Implementation Plan.
N - Reduce the GHG intensity of water supply conveyance, treatment and distribution Reduce the intensity of GHG emissions from water utilities (including water supply, wastewater, and recycled water) conveyance, treatment and distribution by eight percent by 2035.		
N-1	Improve water utilities (including water supply, wastewater, and recycled water) conveyance, treatment and distribution, and other system improvements. *(Mid to Long-term)*	Incorporating energy efficiency into system improvements is standard practice for CMWD. During this reporting period, several sewer pumps were replaced including three pumps at Home Plant Lift Station, one pump at Cannon Lift Station and one pump at Batiquitos Lift Station. At the Home Plant Lift Station, the power generator was replaced and ongoing preventive maintenance for the existing sewer system was performed to increase energy efficiency and improve conveyance.
O - Encourage the installation of greywater and rainwater systems Encourage the installation of greywater and rainwater collections systems with a goal of 15 percent of homes by 2035.		
O-1	Host workshops on greywater and rainwater collection systems through the Carlsbad Municipal Water District, or partner with existing workshop providers, for homeowners interested in installing systems suitable for their property. *(Mid-term)*	This is a mid-term action, planned for Years 3 - 5. There was no activity on this action during the reporting period.
O-2	Create a greywater design reference manual, or provide links to an existing one, for the design of greywater and rainwater collection systems. *(Mid-term)*	This is a mid-term action, planned for Years 3 - 5. There was no activity on this action during the reporting period.
O-3	Evaluate the feasibility of offering a rebate for residential greywater systems that require a permit to cover the cost of obtaining a permit. *(Mid-term)*	This is a mid-term action, planned for Years 3 - 5. There was no activity on this action during the reporting period.