

City of Carlsbad Climate Action Plan Annual Report

Reporting Period 5: Jan 1, 2021 – Dec. 31, 2021

April 19, 2022

City of Carlsbad
Environmental Management
1635 Faraday Avenue
Carlsbad, CA 92008
Contact: Katie Hentrich, CAP Administrator
katie.hentrich@carlsbadca.gov; 442-339-2623



Table of Contents

	<u>Page</u>
I. Executive Summary.....	Error! Bookmark not defined.
II. Background	2
III. CAP Measures and Actions	7
IV. Monitoring	10
V. GHG Emissions Inventories	15
VI. CAP Update	18
VII. Conclusion.....	19
Appendix A	i

Tables and Figures

	<u>Page</u>
Figure 1 – GHG Emissions Baseline, Reductions, and Targets	1
Figure 2 – AR5 CAP Action Status	4
Figure 3 – 2012 Community GHG Emissions by Sector.....	4
Table 1 – 2012 Community GHG Emissions by Sector	4
Figure 4 – Sample CAP Projections and Targets	5
Table 2 – CAP Measures and GHG Reductions	6
Table 3 – PV System Installations in Reporting Period 5 (Jan. 1, 2021 – Dec. 31, 2021)	10
Figure 5 – Residential PV Installations to Date	11
Figure 6 – Non-Residential PV Installations and CAP Projections and Targets.....	11
Figure 7 – CVRP Participation in Carlsbad – March 2011 through Aug. 2021	12
Table 4 – CVRP Participation in Carlsbad – Jan. 1, 2021 to Aug. 31, 2021.....	13
Figure 8 – Bikeways by Classification.....	14
Figure 9 – 2016 Community GHG Emissions by Sector.....	16
Table 5 – 2016 Community GHG Emissions by Sector	16
Figure 10 – 2018 Community GHG Emissions by Sector.....	17
Table 6 – 2018 Community GHG Emissions by Sector	17

I. Executive Summary

The purpose of this document is to provide an update on the status of implementation of the Climate Action Plan (CAP) that occurred during the most recent 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. This annual report for Year 5 (AR5) covers the period from Jan. 1, 2021 to Dec. 31, 2021.

The CAP established a 2012 baseline of 977,000 metric tons of carbon dioxide equivalent (MTCO₂e). This baseline was used to project greenhouse gas (GHG) emissions into the future and set targets within the CAP; specifically, the CAP sets goals to reduce GHG emissions by 4% below the 2012 baseline by 2020 (a reduction of approximately 39,080 MTCO₂e) and 52% below baseline by 2035 (a reduction of approximately 508,040 MTCO₂e). The most recent GHG inventory from 2018¹ shows the city surpassing its 2020 targets with a 4.8% reduction in GHG emissions (a reduction of approximately 47,000 MTCO₂e), as seen in Figure 1.

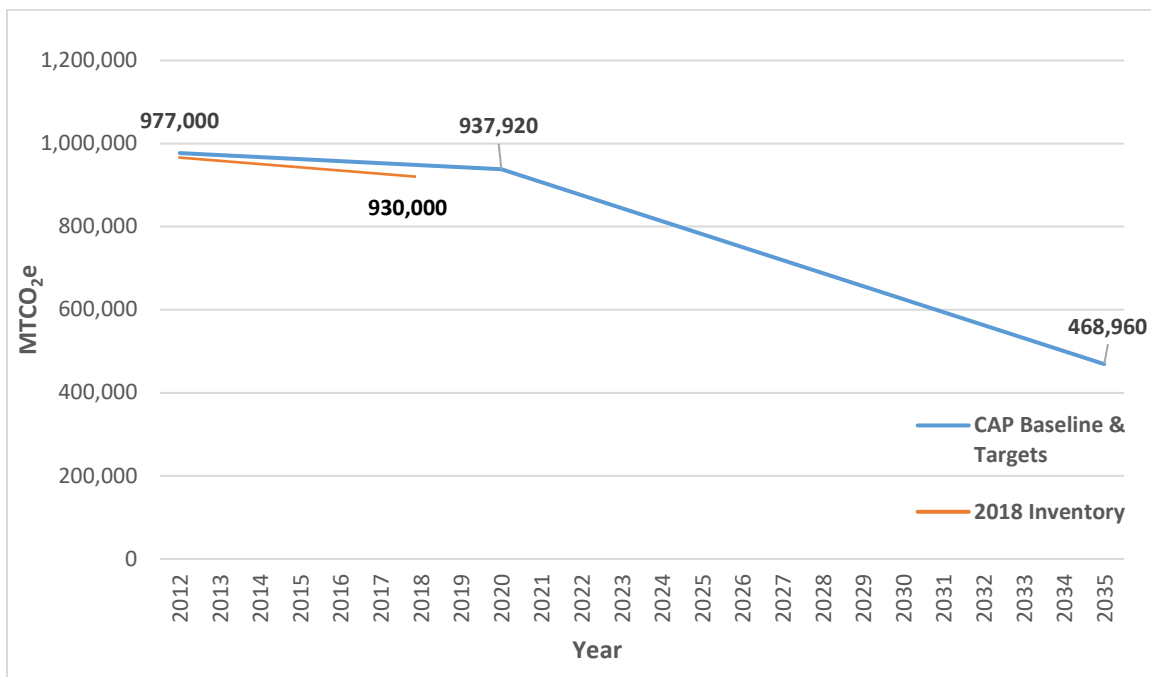


Figure 1. GHG Emissions Baseline, Reductions, and Targets

¹ More details on this and other GHG inventories are provided in Section VI.

The CAP includes measures and actions that the city must pursue to meet its GHG reduction targets. There are 12 measures and 35 actions included in the CAP². Through Year 5, 11 actions have been completed, 20 are in progress and on schedule, 3 are in progress and delayed, and 1 action has no progress³. Figure 2 shows this information as percentages.

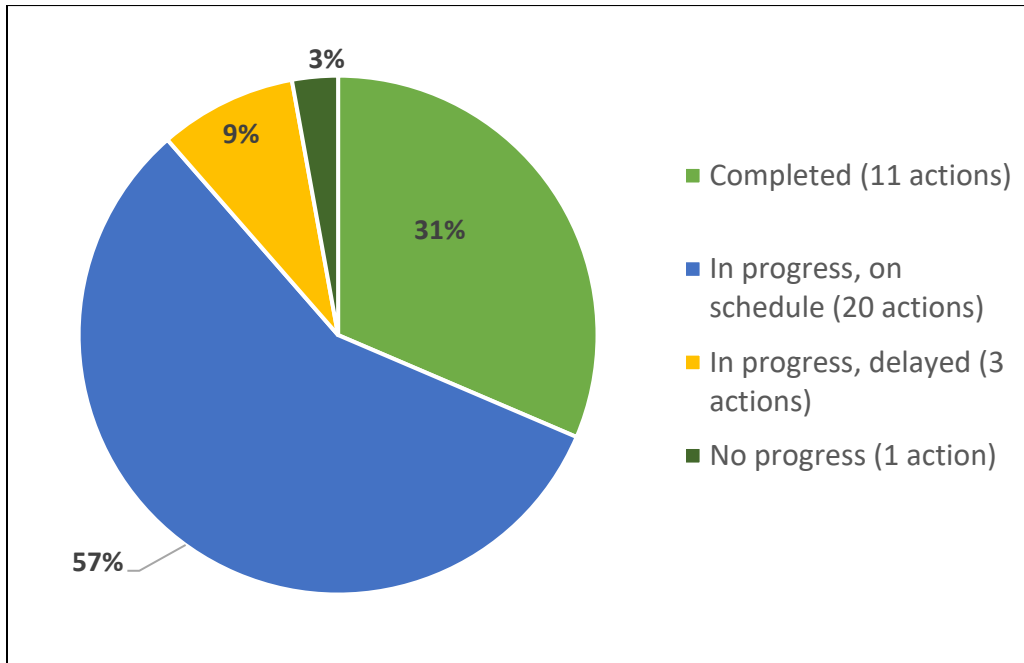


Figure 2. AR5 CAP Action Status

II. Background

The City of Carlsbad’s CAP was adopted on Sept. 22, 2015, along with the General Plan Update and associated Environmental Impact Report (EIR). The purpose of the CAP is to describe how GHG emissions within Carlsbad will be reduced in accordance with statewide targets. The CAP was updated and amended on July 14, 2020 (CAP Amendment No. 1). This amendment revised the GHG inventory and reduction targets and forecast, updated reductions from existing measures, added a new reduction measure, and incorporated new regional and statewide

² A list of CAP measures can be found in Table 2 and implementation status of each measure and action can be found in Appendix A.

³ Actions categorized as “completed” met the implementation goals in the time indicated in the CAP; however, some of these actions continue to be implemented and are denoted as such. Actions with an “ongoing” implementation timeframe were assumed to be “in progress” versus “completed”, since implementation of the measures continues for the duration of CAP implementation.

guidance and protocols; an Addendum to the EIR was also prepared. Since CAP Amendment No. 1 is the currently adopted CAP, its details are reflected throughout this report.

Chapter 2 of the CAP contains information about the 2012 GHG inventory. 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 (VMT), 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 the participating city departments and divisions were surveyed to quantify the resources needed to effectively implement the CAP. On Feb. 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 several city departments and divisions, coordinated by the CAP Administrator. The interdepartmental CAP implementation team consists of: Public Works (PW) Branch – General Services, Traffic and Mobility, Environmental Management and Utilities; Community Services – Community Development, Parks & Recreation; Administrative Services - Finance, City Attorney; and City Manager - Communications. Team members coordinate on an ongoing basis to discuss CAP implementation activities and opportunities for collaboration.

Figure 3 and Table 1 below show the 2012 GHG emissions graphically and in tabular form for the entire city, including emissions from both municipal operations and the community. Municipal operations constitute approximately 1% of all GHG emissions. Since there are several different types of GHGs, GHG emissions are typically expressed in MTCO_{2e} to allow for standardization and comparison.

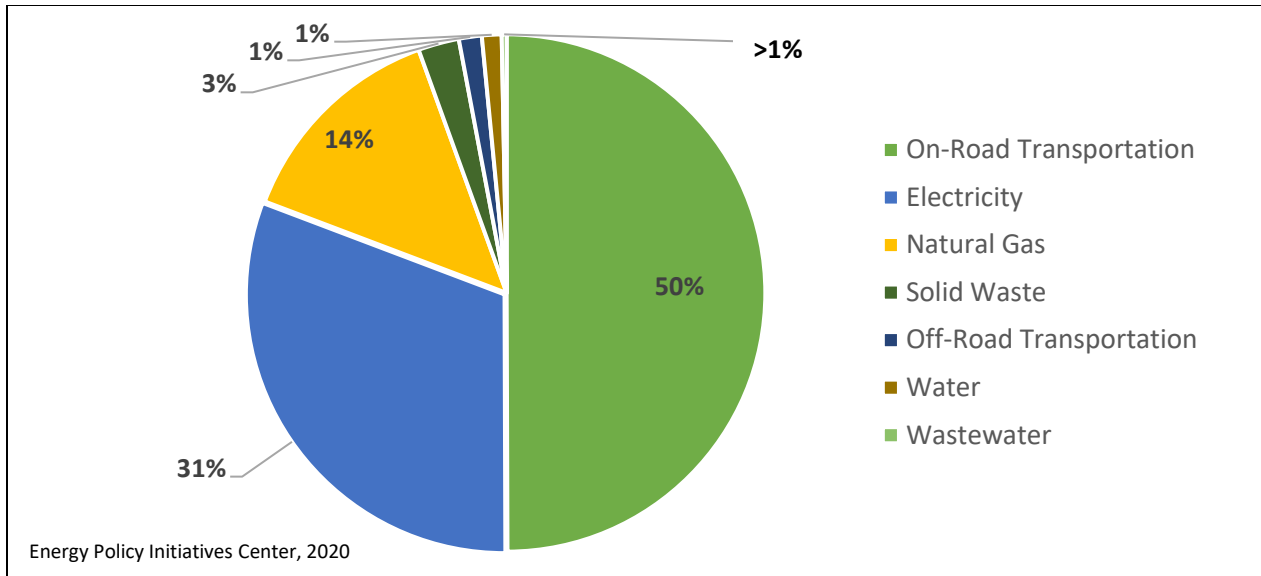


Figure 3 – 2012 Community GHG Emissions by Sector

Table 1 – 2012 Community GHG Emissions by Sector

Emissions Category	GHG Emissions (MTCO ₂ e)	Percentage of Total Emissions (%)
On-Road Transportation	488,000	49.9
Electricity	301,000	30.8
Natural Gas	134,000	13.7
Solid Waste	25,000	2.5
Off-Road Transportation	14,000	1.4
Water	12,000	1.2
Wastewater	3,000	<1
Total	977,000	100

Emissions in each category are rounded. Sum may not add up to totals due to rounding.

Energy Policy Initiatives Center, 2020

Of the total emissions in 2012, 97% are attributed to the residential, commercial, industrial, and transportation sectors (e.g. buildings, automobiles). This emissions profile by sector is typical of other cities; therefore, like most other CAPs, Carlsbad’s CAP focuses primarily on GHG emissions reduction strategies in these sectors.

Forecasts for the Carlsbad CAP were conducted for 2020 and 2035 GHG emissions by EPIC. The CAP used the 2012 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 requirements for utilities to provide electricity from renewable energy sources; these reductions are known as the “legislatively-adjusted BAU”, as shown in Figure 4.

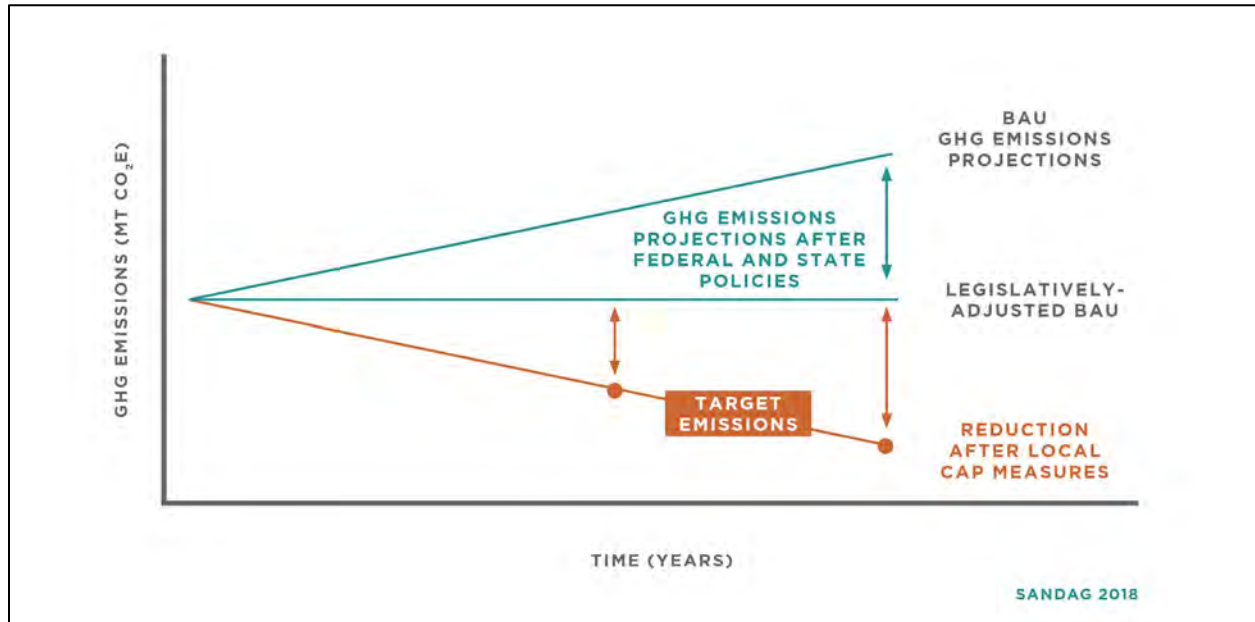


Figure 4. Sample CAP projections and targets

The Carlsbad CAP considered another category of anticipated GHG emissions reductions from the BAU and legislatively-adjusted 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 system 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 (EO) S-3-05 and the Global Warming Solutions Act of 2006, Assembly Bill (AB) 32. Collectively they call for a reduction to 1990 levels by 2020 and 80% below 1990 levels by 2050. For Carlsbad, the targets are 4% below the 2012 baseline by 2020 and 52% below the 2012 baseline by 2035. Prior to 2020, Carlsbad had surpassed the reductions needed to meet the 2020 goal.

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, should result in the modeled GHG emissions reductions, also shown in

Table 2. Since CAP Amendment No. 1 removed some of the measures included in the 2015 CAP, the measures have some letters “missing.”

Table 2 – CAP Measures and GHG Reductions

Measure Letter	GHG Reduction Measures	GHG Reductions in 2035 (MTCO₂e)
B	Install commercial and industrial PV systems	4,457
D	Encourage single-family residential efficiency retrofits	7,986
E	Encourage multi-family residential efficiency retrofits	3,993
F	Encourage commercial and city facility efficiency retrofits	7,579
I	Replace Incandescent bulbs with LED bulbs	22
J	New construction residential and commercial solar water heater/heat pump installation & retrofit of existing residential	2,813
K	Promote Transportation Demand Management	6,325
L	Increase zero-emissions vehicle travel	49,912
M	Develop more citywide renewable energy projects	2,774
N	Reduce the GHG intensity of water supply conveyance, treatment and delivery	713
O	Encourage the installation of greywater and rainwater systems	137
P	Implement Community Choice Energy	56,207
Total GHG Reductions		142,918

III. CAP Measures and Actions

The CAP measures listed in Table 2 can be grouped into four strategy areas: Energy Efficiency, Renewable Energy (including Clean Electricity), Transportation, and Water. For each of the

measures, there are detailed Actions that, taken together, should result in the anticipated GHG emissions reductions.

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 encompass 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,” or 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 approximately 15%⁴ of the planned GHG emissions reductions.

Measures D, E, F, and I all deal with energy efficiency, both in community and municipal operations. These measures call for ordinances mandating energy efficiency improvements in residential and non-residential construction, 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, including the energy efficiency ordinances for major renovations of existing residential and non-residential buildings. Data from these ordinances is tracked through the city’s permitting system, EnerGov, in a separate “CAP tab.”

The city also continues to seek energy efficiency upgrades in municipal buildings. Heating, Ventilation and Cooling (HVAC) equipment and lighting are replaced with higher efficiency units and bulbs/fixtures. Staff works with the HVAC system consultant to maximize efficiency in operations. During the reporting period, staff converted 186 fixtures to LED throughout three community parks.

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

⁴ This value is rounded.

the CAP, renewable energy measures will account for approximately 46%⁵ of the planned GHG emissions reductions.

Measures B, J, M, and P relate to community and city renewable energy improvements and increasing the amount of renewable energy on the electrical grid. These measures include ordinances requiring solar photovoltaic (PV) systems in new non-residential construction and existing commercial buildings, alternative energy water heating systems, citywide renewable energy projects, promotion of renewable energy rebate and incentive programs, and participation in a community choice energy program.

During the reporting period, staff continued implementing the city's energy efficiency ordinances. These require installation of solar PV panels for all new residential and non-residential development and major renovations of existing residential and non-residential buildings, as well as alternative energy water heating for all new residential and non-residential development. Data from these ordinances is tracked through EnerGov.

Furthermore, in May 2021, the Clean Energy Alliance (CEA) launched. CEA is a community choice energy program that allows for local control of electricity procurement and an increase in the proportion of renewable energy serving its customers. CEA is currently comprised of Carlsbad, Del Mar, and Solana Beach; in late 2021, the cities of Escondido and San Marcos voted to join CEA in 2023. CEA anticipates reaching 100% clean electricity by 2030.

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. Reducing the length of trips and/or the need to use a motorized vehicle can significantly reduce GHG emissions. The second facet is to reduce or eliminate the GHG emissions coming from vehicles. Known as low- or zero-emission vehicles (ZEVs), these automobiles include alternative-fueled vehicles, hybrids, and electric vehicles (EVs). In the CAP, transportation-related measures account for approximately 39%⁶ of the planned GHG emissions reductions.

Measures K and L address transportation related GHG emissions reductions. Measure K relates to reducing VMT and is closely tied to policies contained in the General Plan Mobility Element. During the reporting period, staff continued implementing the Transportation Demand Management (TDM) ordinance for non-residential development that meets the ordinance's trip threshold; data from this ordinance is tracked through EnerGov. Staff also continued implementing elements of the TDM Plan, including outreach on CarlsbadCommuter.com, creation of resources to support hybrid work, outreach through the Move Carlsbad initiative,

⁵ This value is rounded.

⁶ This value is rounded.

and electric bike (e-bike) education and bike education tours. Also, the Sustainable Mobility Plan was adopted during the reporting period.

Measure L involves reducing tailpipe emissions through an increase in the proportion of low and ZEVs on the road. Staff continued implementation of an ordinance requiring installation of EV charging infrastructure for all new residential and non-residential development and major renovations of existing residential buildings; data for this ordinance is tracked in EnerGov.

During the reporting period, staff updated Administrative Order #3 (Fleet Management Program) to include a vehicle acquisition policy to require the purchase of low and ZEVs where feasible. Staff also worked with SDG&E to install EV charging infrastructure, including DC fast charging, for fleet vehicles; the City Council approval of these charging stations occurred after the reporting period concluded. Furthermore, a total of 24 city vehicles were replaced with hybrid alternatives, and one hybrid city vehicle was replaced with a plug-in hybrid.

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. In the Carlsbad CAP, water measures account for less than 1%⁷ of the planned GHG emissions reductions.

The Carlsbad Municipal Water District (CMWD) analyzes energy usage of their pumps and endeavors to increase energy efficiency of equipment whenever it is replaced. For example, during this reporting period, staff replaced lighting and generators at various lift stations. 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 D, E, F, and I all contain Actions related to public outreach and education. During the reporting period, the COVID-19 pandemic drastically altered Communications staff priorities. However, staff still implemented several public outreach and education efforts, including maintaining the city's website with information on rebates and incentives for energy efficiency, renewable energy, and EVs for both residential and commercial consumers.

⁷ This value is rounded.

Staff also continued promoting the Carlsbad Green Business Program and began website updates to promote the Home Energy Score Assessment program (to be completed in 2022).

IV. 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 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 and F require San Diego Gas and Electric (SDG&E) electric and natural gas energy usage. Monitoring for Measure P requires CEA usage data. Monitoring for Measure L requires VMT model output data. This data will be collected during the biannual GHG inventory process, conducted by SANDAG, and reported in the corresponding CAP Annual Report.

A. Renewable Energy

Measure B involves increasing the amount of solar PV systems in Carlsbad. Data for the reporting period were obtained from the permit via EnerGov. Table 3 shows the number and capacity in kilowatts (kW) of PV system installations in the residential and non-residential sectors during the reporting period.

Table 3 – PV System Installations in Reporting Period 5 (Jan. 1, 2021 – Dec. 31, 2021)

Sector	Total Finaled Permits (#)	Total Capacity (kW)	Highest Capacity Project (kW)	Lowest Capacity Project (kW)	Median Project Capacity (kW)
Residential	1,108	6,996.94	25.16	0.945	6.31
Non-residential	6	613.22	250	7.38	102.2

Figures 5 and 6 show the residential and non-residential PV installations as they relate to the CAP projections and target. The data were obtained from SDG&E grid interconnections and the city’s EnerGov system. As of January 2020, the California building code requires PV in new residential construction, which is a contributing factor to the increase in residential PV. Because of this legislation, CAP Amendment No. 1 removed the residential PV measure and subsequent target. However, Figure 5 shows the residential PV installations over time based on available data; through 2021, 48.032 MW have been installed.

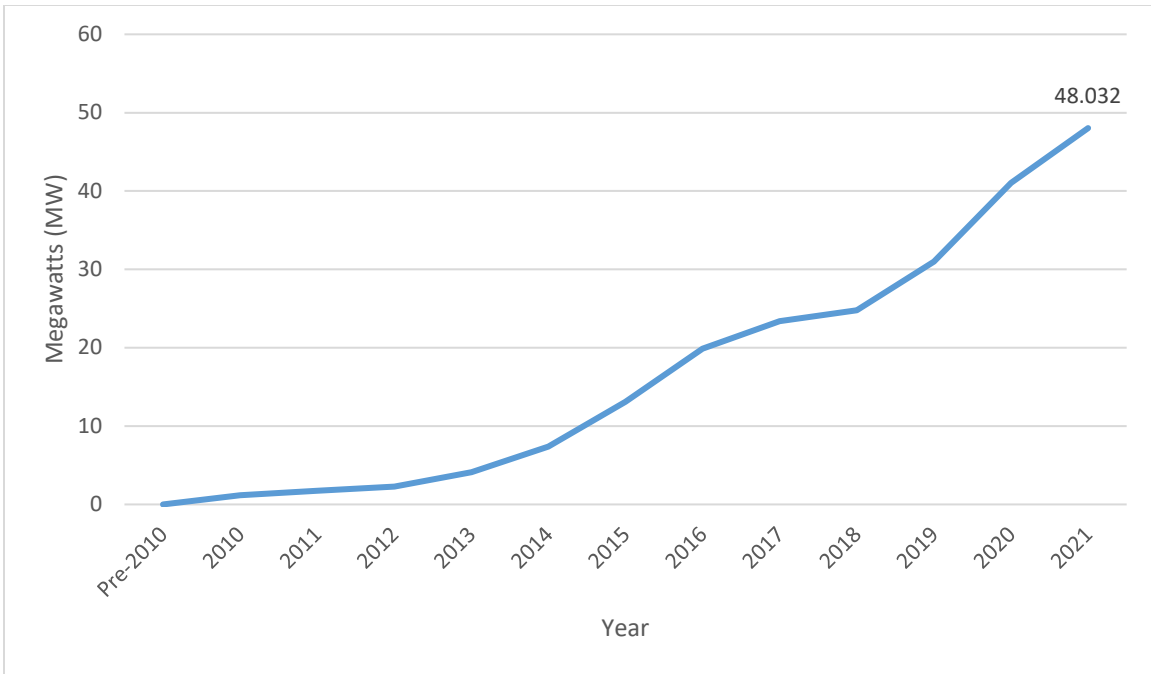


Figure 5 - Residential PV Installations to Date

As seen in Figure 6, the non-residential installations currently exceed the trend line amount for reaching the CAP target of 33.54 MW of capacity by 2035. Through 2021, 16.8 MW have been installed.

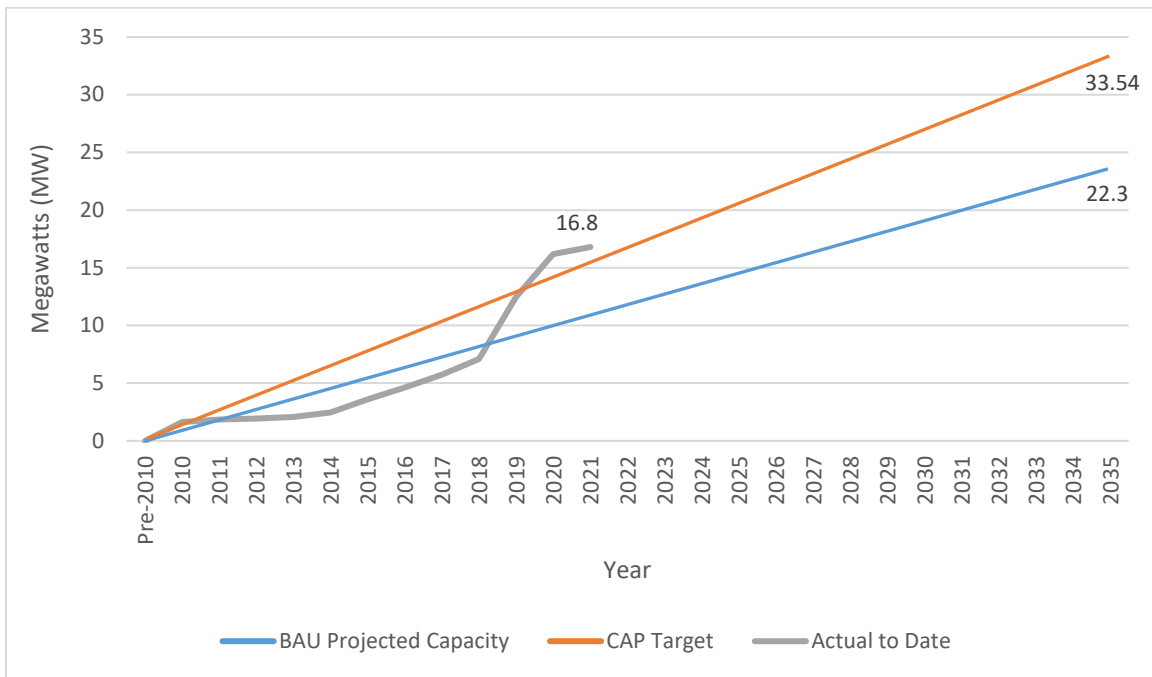


Figure 6 – Non-residential PV Installations and CAP Projections and Target

B. Electric Vehicles

CAP Measure L involves promoting an increase in the proportion of ZEV miles traveled, specifically EVs, of 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.

The California Air Resources Board (CARB) administers the Air Quality Improvement Program (AQIP), intended to fund clean vehicle and equipment projects, air quality research, and workforce training. One of the AQIP programs is the Clean Vehicle Rebate Program (CVRP). Administered by the Center for Sustainable Energy (CSE), the CVRP provides rebates for the purchase or lease of clean vehicles. CVRP participation statistics can be used to gauge EV ownership. Figure 7 shows the annual CVRP participation within Carlsbad, expressed through number of rebates, from March 2011 through Aug. 2021⁸.

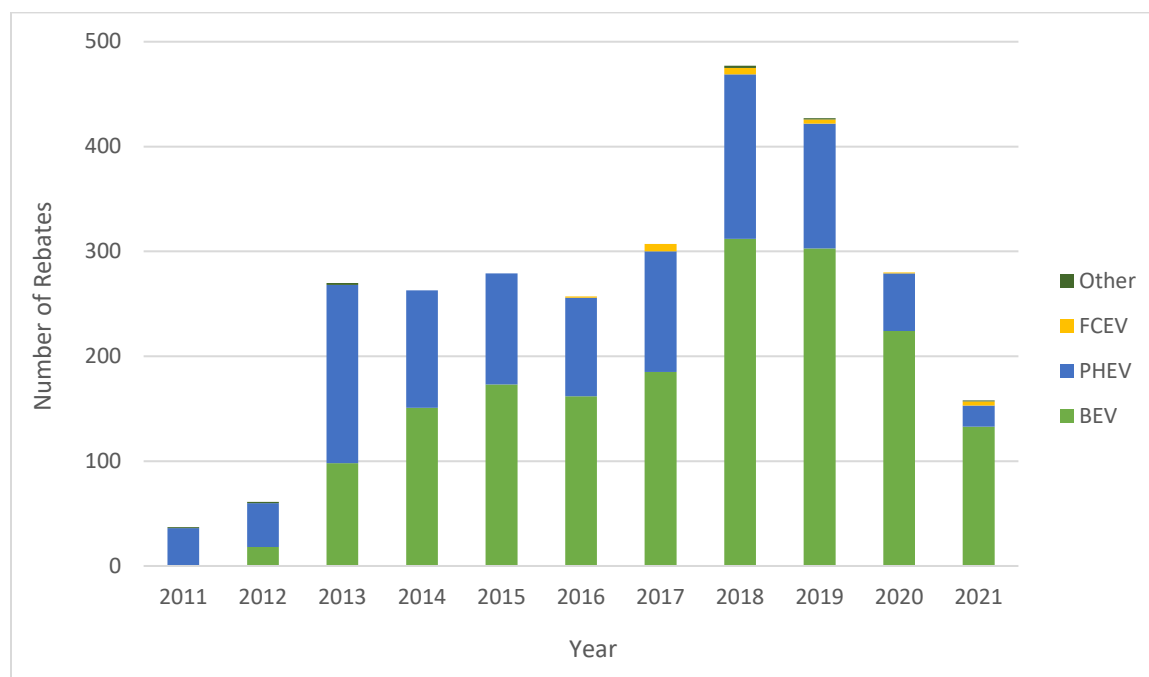


Figure 7 – CVRP Participation in Carlsbad – March 2011 through Aug. 2021⁹

Data for the reporting period is available from Jan. 1, 2021 to Aug. 31, 2021, and CVRP participation is available in Table 4. The city also continues to acquire clean vehicles as part of its fleet conversion strategy; during the reporting period, the city purchased one PHEV.

⁸ Center for Sustainable Energy (2022). California Air Resources Board Clean Vehicle Rebate Project, Rebate Statistics. Data last updated Jan. 18, 2022. Retrieved Jan. 31, 2022 from <https://cleanvehiclerebate.org/rebate-statistic>

⁹ BEV = battery-electric vehicle; PHEV = plug-in hybrid electric vehicle; FCEV = fuel-cell electric vehicle; other = non-highway, motorcycle & commercial BEV.

Table 4. CVRP participation in Carlsbad - Jan. 1, 2021 to Aug. 31, 2021

Clean Vehicle Type	Number of Rebates
Battery electric vehicle (BEV)	133
Plug-in hybrid electric vehicle (PHEV)	20
Fuel cell electric vehicle (FCEV)	4
Other	1

C. General Plan Transportation Policies

In addition to the CAP Measures and Actions described in Section III of this report, 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 (approximately 7.6% of 2035 reductions), it is important to track progress in completing these improvements because they contribute increased and multimodal mobility within the city.

During the reporting period, no pedestrian system improvements were constructed. However, staff prepared the design for the 2022 Carlsbad Sidewalk Construction Project for City Council approval in early 2022; sidewalk construction is expected in the second half of 2022. The city currently has 188.78 miles of bikeways, as shown in Figure 8. Also, 0.73 additional miles of Class II bikeways were added to the system during the reporting period.

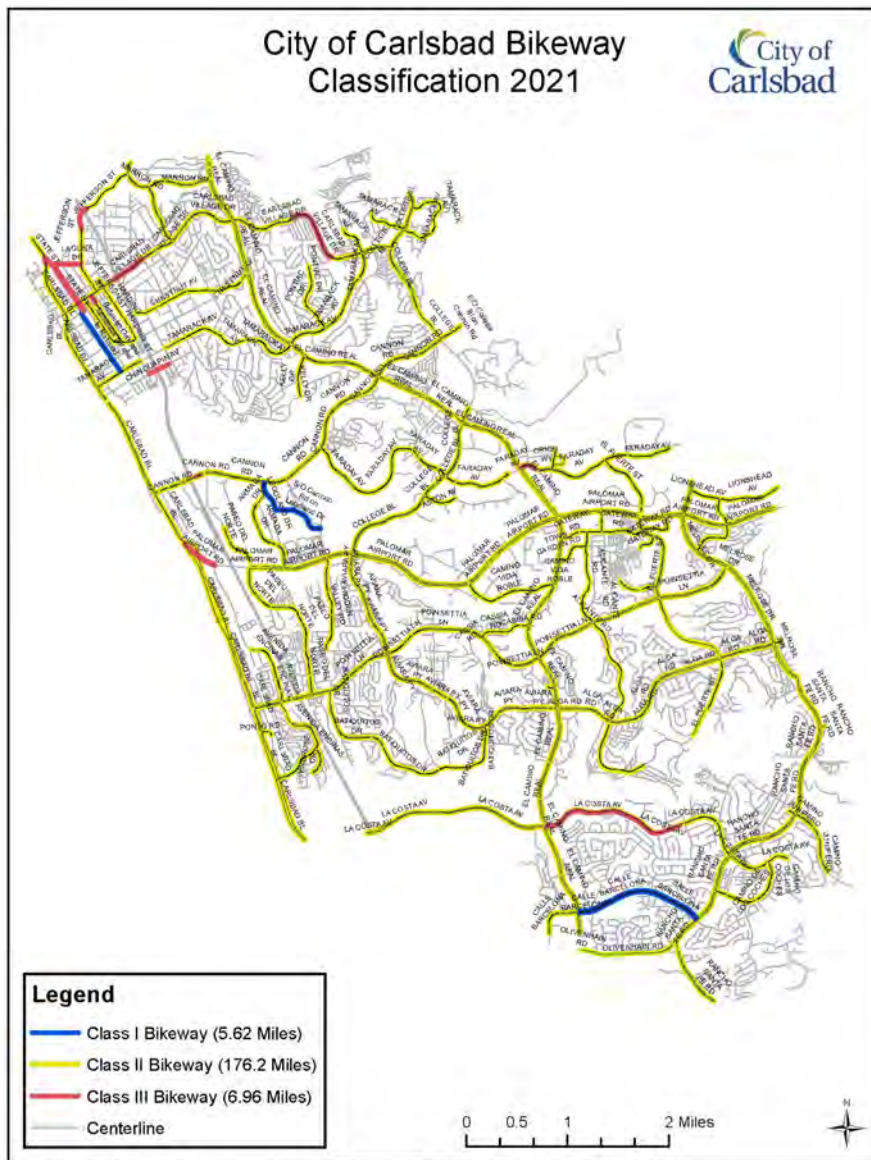


Figure 8 – Bikeways by Classification

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, which was adopted by the City Council on July 24, 2018. The recommendations in the PMP include hiring a parking 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.

During the reporting period, the city's parking consultant conducted field work to evaluate parking in the area outlined in the PMP, which is slightly larger than the area of the Village and Barrio Master Plan. The updated study included an evaluation of the current parking conditions, changes to parking supply, and the impact of temporary restrictions in land use conditions due to the ongoing COVID-19 pandemic. Additional recommendations in the 2021 study include reconfiguring parking spaces in the Village, researching metered parking options, conducting a comprehensive update of the PMP, and considering providing a local neighborhood shuttle within the PMP district funded by parking fees.

Transportation Improvements

During the reporting period, the City Council adopted the Sustainable Mobility Plan which consolidates decades of planning and community input to plan the city's future active transportation networks, improve transportation related safety, reduce GHG emissions and VMT, and shift how residents get around the city away from private automobiles towards modes that are more sustainable. The Sustainable Mobility Plan will provide the basis for future city mobility programs and the buildout of the city's active transportation network.

D. New Development Projects

The CAP serves as an environmental review tiering document, or "Qualified CAP," pursuant to Section 15183.5 of the California Environmental Quality Act (CEQA) Guidelines. MTCO_{2e} must either demonstrate consistency with the CAP or submit a project specific GHG analysis for review and approval.

To evaluate project CAP consistency, the Planning Division uses the CAP Consistency Checklist (Checklist) and accompanying Guidance for Demonstrating Consistency with the CAP – For Discretionary Projects Subject to CEQA (Guidance). The Checklist and Guidance are available at: <http://www.carlsbadca.gov/services/building/forms/default.asp>.

During the reporting period, no projects exceeded the 900 MTCO_{2e} threshold; therefore, no projects were subject to CEQA CAP compliance review.

V. GHG Emissions Inventories

As part of its Climate program, SANDAG coordinates with local jurisdictions to prepare biennial GHG inventories. These inventories are based upon energy consumption data from SDG&E, VMT modeling data from SANDAG, and other information such as waste disposal and water consumption. These inventories, along with other local GHG reduction activity, are released as a jurisdiction-specific "ReCAP Snapshot." To date, SANDAG has released 2016 and 2018

Snapshots, available at SANDAG’s Climate Data Portal (<https://climatedata.sandag.org/>) and on SANDAG’s website (<https://sandag.org/climate>). A 2020 Snapshot is estimated to be completed by mid-2022. Figure 9 and Table 5 show Carlsbad’s 2016 ReCAP Snapshot data; Figure 10 and Table 6 show the 2018 ReCAP Snapshot data.

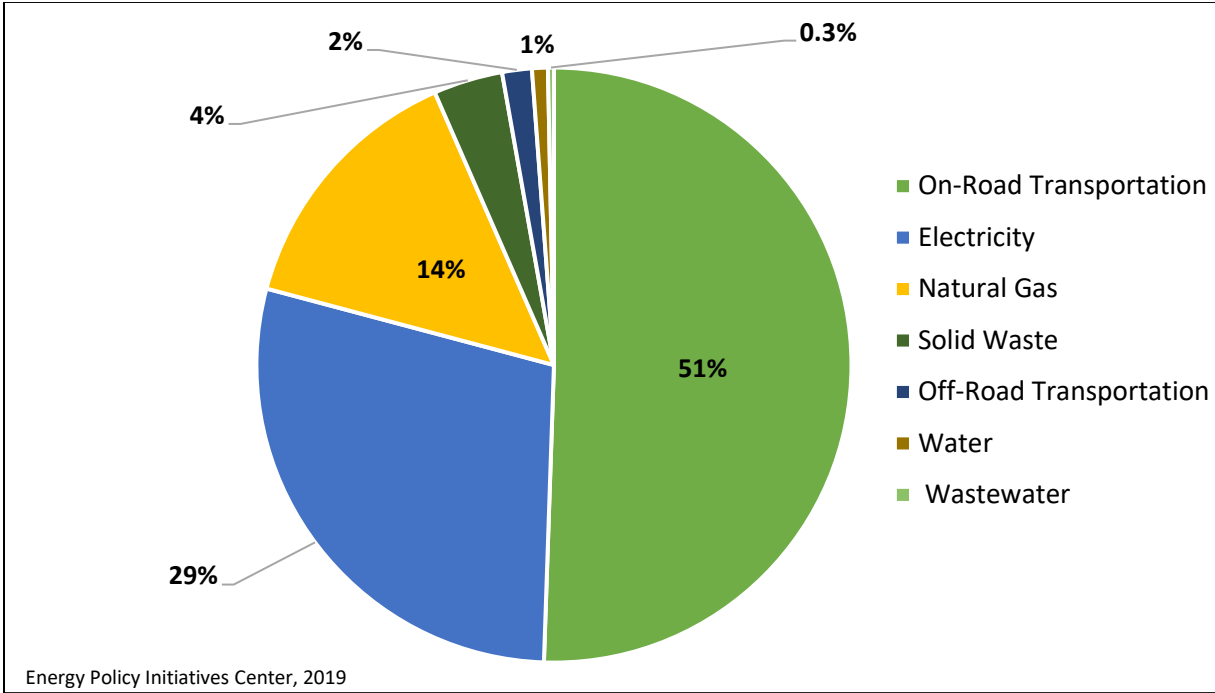


Figure 9 – 2016 Community GHG Emissions by Sector

Table 5 – 2016 Community GHG Emissions by Sector

Emissions Category	GHG Emissions (MTCO ₂ e)	Percentage of Total Emissions (%)
On-Road Transportation	470,000	51
Electricity	266,000	29
Natural Gas	133,000	14
Solid Waste	35,000	4
Off-Road Transportation	15,000	2
Water	8,000	1
Wastewater	3,000	<1
Total	930,000	100

Emissions in each category are rounded. Sum may not add up to totals due to rounding.
 The emissions categories are the same as the emissions categories included the Carlsbad CAP
 Energy Policy Initiatives Center, 2019

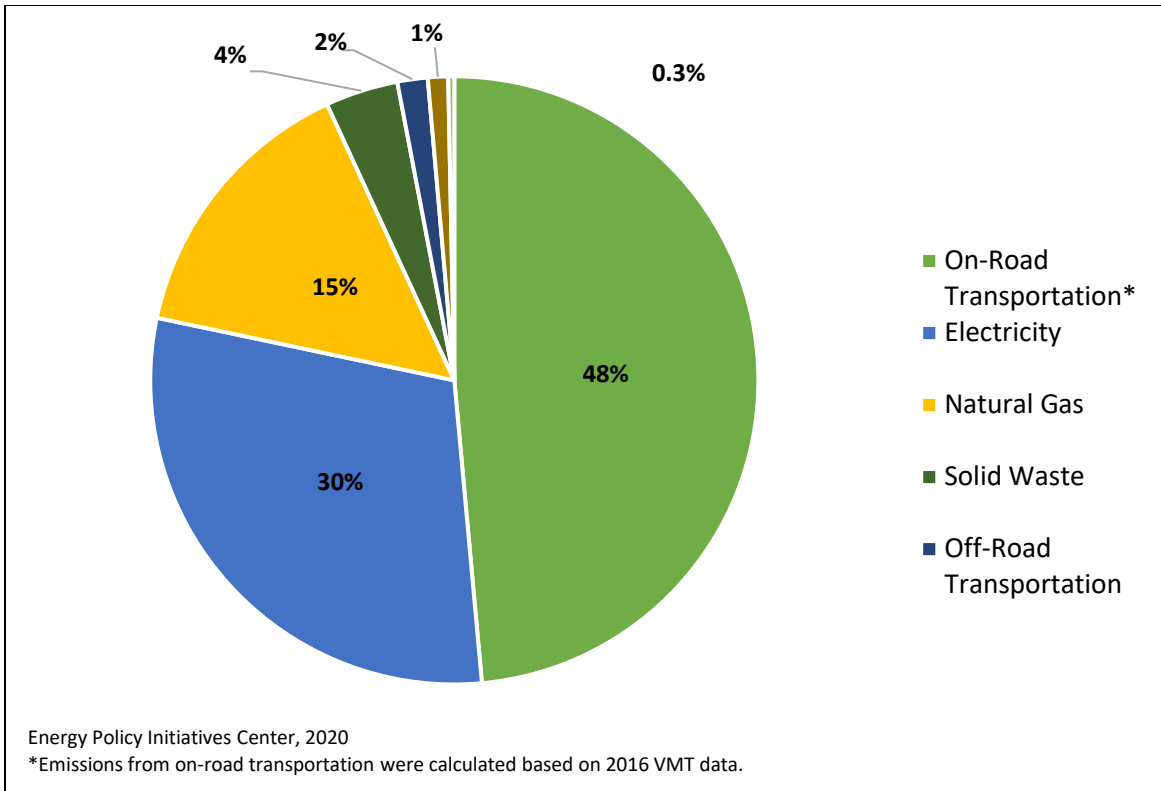


Figure 10 – 2018 Community GHG Emissions by Sector

Table 6 – 2018 Community GHG Emissions by Sector

Emissions Category	GHG Emissions (MTCO ₂ e)	Percentage of Total Emissions (%)
On-Road Transportation*	452,000	49
Electricity	277,000	30
Natural Gas	138,000	15
Solid Waste	36,000	4
Off-Road Transportation	15,000	2
Water	10,000	1
Wastewater	3,000	<1
Total	930,000	100

*Emissions from on-road transportation were calculated based on 2016 VMT data.
 Emissions in each category are rounded. Sum may not add up to totals due to rounding.
 The emissions categories are the same as the emissions categories included the Carlsbad CAP.
 Energy Policy Initiatives Center, 2020

As discussed in Section I of this report, the CAP sets goals to reduce GHG emissions by 4% below the 2012 baseline by 2020 (a reduction of approximately 39,080 MTCO₂e) and 52% below baseline by 2035 (a reduction of approximately 508,040 MTCO₂e). The most recent GHG inventory from 2018 (Figure 10 and Table 6) shows the city surpassing its 2020 targets with a 4.8% reduction in GHG emissions (a reduction of approximately 47,000 MTCO₂e). This trendline can be seen in Figure 1 in Section I. As CAP implementation continues, progress towards the 2035 target will be assessed in future reporting.

VI. CAP Update

On Nov. 23, 2021, the city executed a professional services agreement (PSA) with EPIC to prepare a comprehensive update to the CAP; this PSA also includes Ascent Environmental as a sub-consultant. The consultant team and staff are working to evaluate the city's CAP and prepare an updated document. To date, the consultant team and staff have reviewed existing CAP measures, prepared a public outreach plan, began stakeholder outreach, analyzed updated state legislation and policies, and met with city staff from multiple departments.

An important component of the climate action planning process is estimating primary sources and annual levels of GHG emissions for a baseline year and projecting estimated trends and GHG emissions into the future. The baseline year and projections are reflected in a GHG inventory, which provides detailed accounting of the sources and quantities of GHG emissions generated from activities within the city. To prepare the GHG inventory, a variety of data must be used to assume population, employment, and transportation trends. A major source of this data comes from SANDAG through its transportation forecasts and Activity Based Model (ABM), which support long-range transportation and planning efforts such as climate action planning. SANDAG's ABM was recently updated with the adoption of San Diego Forward: The 2021 Regional Plan, and this update is known as "ABM2+". This version includes all the land use growth assumptions included in the 2021 Regional Plan; SANDAG is delayed in publishing ABM2+ but expects to do so in the coming months.

Once ABM2+ is published, any customized requests can be prepared in the order they are received; a custom run of ABM2+ could include any special specific growth assumptions, such as the land use forecasts derived from the Housing Element Update rezoning program. As the CAP Update progresses, it is important to align data and modeling used to forecast growth within Carlsbad with other concurrent city efforts, such as the assumptions and site analyses being used for the Housing Element Update rezoning program. Because of the delay of publishing ABM2+ and the potential customization request, incorporating ABM2+ into the CAP Update will cause a delay in the project schedule, currently estimated at three to nine months depending on the length of the delay in publishing ABM 2+, specificity of the modeling request, and the direction of the City Council.

As work continues, staff will continue to provide updates to City Council on the status of the CAP update. Depending on which version of ABM2+ is used, the CAP Update is anticipated to be completed by mid- to late- 2023. As such, it is anticipated that the current CAP will be the focus of the next Annual Report. More information can be found on the city's webpage at: <https://www.carlsbadca.gov/departments/environmental-sustainability/climate-action-plan>.

VII. Conclusion

During the fifth CAP reporting period, staff continued to make progress in carrying out the CAP measures and Actions. During the next calendar year, staff will continue to work and coordinate with consultants, SANDAG, SDG&E, and other regional and business partners to further CAP implementation and lower GHG emissions. Staff and the consultant team will also continue work on an update to the city's CAP.

Appendix A

CAP AR5 Implementation Activities by Measure and Action

CAP Measures and Actions 2035 Performance Goals for Measures		CAP AR5 Implementation Activities and Status
<p><i>Timeframes in CAP:</i> Short-term = 1 - 2 years Mid-term = 2 - 5 years Short to Long-term & Mid-Long-term = begun but not completed in 5 years Ongoing = continue for the duration of CAP implementation</p>		<p><i>Implementation status:</i> Complete In progress, on schedule In progress, delayed Not started</p>
<p>B - Promote installation of commercial and industrial photovoltaic systems Promote installation of commercial and industrial PV systems to produce an additional 11.24 MW above projected amounts by 2035.</p>		
B-1	Implement and enforce Title 18, Chapter 18.30, Section 18.30.130 of the Carlsbad Municipal Code, mandating solar photovoltaic energy generation systems on new non-residential buildings. <i>(Ongoing)</i>	Staff continued to implement the solar PV ordinance adopted by City Council as Ordinance No. CS-347. This ordinance requires all new nonresidential buildings to install solar PV systems to offset a portion of their electricity requirements. <i>(In progress, on schedule)</i>
B-2	Implement and enforce Title 18, Chapter 18.30, Section 18.30.130 of the Carlsbad Municipal Code, mandating solar photovoltaic energy generation systems on existing non-residential buildings undergoing major renovations. <i>(Ongoing)</i>	Staff continued to implement the solar PV ordinance adopted by City Council as Ordinance No. CS-347. This ordinance requires existing nonresidential buildings that undergo major renovations or additions to install solar PV systems to offset a portion of their electricity requirements. <i>(In progress, on schedule)</i>
<p>D - Encourage single-family residential efficiency retrofits Encourage single-family retrofits with the goal of 50% energy reduction compared to baseline in 30% of the total single-family homes citywide (approximately 10,000 single-family homes out of total of 35,000.)</p>		
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. <i>(Short-term)</i>	Staff continued to maintain a website with rebate and incentive information and made presentations. <i>(Complete)</i>
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. <i>(Short-term)</i>	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. <i>(In progress, delayed)</i>

D-3	Implement and enforce Title 18, Chapter 18.30, Section 18.30.30, mandating energy efficiency measures in existing residential buildings undergoing major renovations. <i>(Ongoing)</i>	Staff continued to implement the energy efficiency ordinance adopted by City Council as Ordinance No. CS-347. This ordinance requires specified energy efficiency measures in all major residential renovations. <i>(In progress, on schedule)</i>
E - Encourage multi-family residential efficiency retrofits Encourage multi-family retrofits with the goal of 50% energy reduction compared to baseline in 30% 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-3 above	See D-3 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% energy reduction in 30% 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% reduction in energy use, beginning with retrofits that would result in most substantial energy savings. <i>(Short-term)</i>	Staff continued to replace Heating, Ventilation and Cooling (HVAC) equipment and lighting with higher efficiency units and bulbs/fixtures. Staff works with the HVAC system consultant to maximize efficiency in operations. Due to the impacts of COVID-19 on city facilities, much of the reporting period was focused on those efforts. <i>(In progress, delayed)</i>
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. <i>(Short-term)</i>	Staff continued to maintain a website with information on rebates and incentives. <i>(Complete)</i>
F-3	Implement and enforce Title 18, Chapter 18.21, Section 18.21.155, mandating energy efficiency measures in new non-residential buildings and existing non-residential buildings undergoing major renovations. <i>(Ongoing)</i>	Staff continued to implement the energy efficiency ordinance adopted by City Council as Ordinance No. CS-347. This ordinance requires specified energy efficiency measures in all new and certain existing nonresidential buildings undergoing major renovations. <i>(In progress, on schedule)</i>

I - Promote replacement of incandescent and halogen bulbs with LED or other energy efficient lamps

Replace 50% of incandescent and halogen light bulbs citywide with LED or similarly efficient lighting by 2035.

I-1	Replace 50% 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. <i>(Short-term)</i>	Staff met this goal during the reporting period. Specifically, Parks & Recreation staff converted 186 fixtures to LED throughout three community parks. Moving forward, staff will continue to replace lighting as identified in this CAP measure and action. <i>(Complete)</i>
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. <i>(Short-term)</i>	Staff continued to maintain a website with information about rebates and incentives. <i>(Complete)</i>
I-3.i	Evaluate the feasibility of adopting a minimum natural lighting and ventilation standard, developed based on local conditions. <i>(Mid-term)</i>	In 2018, the Center for Sustainable Energy (CSE) performed a qualitative feasibility evaluation for natural lighting and ventilation. CSE determined that it would be difficult to provide a cost-effective natural ventilation requirement that goes beyond the 2019 Building Energy Efficiency Standards. CSE noted that nonresidential natural lighting is well-governed in state codes, reducing the need for additional local standards. Daylighting in residential spaces is less likely to be cost-effective than in nonresidential spaces because the code assumes occupants are not typically present in residential spaces during the day to take advantage of daylighting; therefore, the cost of these controls may not be offset by the savings. The feasibility assessment also concluded that there are no known reach codes that include natural lighting and/or natural ventilation requirements that go beyond current code requirements. <i>(Complete)</i>
I-3.ii	Demonstrate natural lighting and ventilation features in future facility upgrade or new construction. <i>(Mid-term)</i>	Staff is incorporating natural lighting and ventilation in the future Orion Center. <i>(In progress, on schedule)</i>

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% 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. <i>(Short-term)</i>	Staff continued to maintain a website with incentive, rebate and financing program information. <i>(Complete)</i>
-----	---	---

J-2	Implement and enforce Title 18, Chapter 18.30, Sections 18.30.150 and 18.30.170, mandating alternative water heating requirements in new residential and non-residential buildings. <i>(Ongoing)</i>	Staff continued to implement the water heating ordinance adopted by City Council as Ordinance No. CS-347. This ordinance requires new residential and nonresidential buildings to install solar thermal water heating or electric heat pump water heaters for water heating needs. <i>(In progress, on schedule)</i>
K - Promote transportation demand management strategies Promote Transportation Demand Management Strategies with a goal of achieving a 10% increase in alternative mode use by workers in Carlsbad, for a total of 32% alternative mode use.		
K-1	Implement the citywide transportation demand management (TDM) plan and strategies. <i>(Ongoing)</i>	<p>In 2021, the Carlsbad Commuter program (program) regained their pre-pandemic employer network size of over two dozen Carlsbad employers engaging with the program. The program continued to pivot strategies, content development and tactics due to the ongoing COVID-19 pandemic and associated impacts to the transportation system and daily commute. The program continued partnerships with regional transportation service providers to monitor and relay ongoing service changes due to national, state, and local COVID protocols that affected transit and other modal availability. Accordingly, the program developed and launched a comprehensive system of digital resources to help employers and managers implement hybrid work. The program developed a Balanced Work marketing campaign to promote these new resources and continues to add content and resources. The program promoted regional and statewide TDM campaigns (Rideshare Week and Bike Anywhere) to both the employer network and the general public. The program also launched a commuter incentive to potentially win gift cards for tracking sustainable trips on the Carlsbad Commuter app. The program assisted in the development and promotion of e-bike training and safety standards, local bike tours, and regional bike safety training. The program assisted in the delivery of workshops for the city’s age-friendly transportation initiative, Move Carlsbad. The program established marketing materials, tools, and communication mediums to reach homeowners associations (HOAs) and schools for deployment in 2022.</p> <p>In 2021, the Carlsbad Commuter website received 1,677 unique visitors to the digital ecosystem. These aggregated efforts were recognized by the leading TDM industry association, the Association for Commuter Transportation, and was awarded third place at the international awards ceremony for the Best Strategy Pivot category. This award recognizes an exemplary program, policy, or service that successfully shifted strategy because of COVID-19. <i>(In progress, on schedule)</i></p>

K-2	Implement and enforce Title 18, Chapter 18.51, mandating TDM improvements and strategies for non-residential development. <i>(Ongoing)</i>	The TDM ordinance efforts include the development of updates to the TDM handbook and the approval of six additional TDM plans in 2021; seven previously approved TDM plans were also evaluated. Six of the seven worksites exceeded their 2020-2025 Sustainable Mode Share goals. Cumulatively, this results in a daily reduction of 57,778 VMT and an estimated daily GHG reduction of 23 MTCO _{2e} . <i>(In progress, on schedule)</i>
L - Promote an increase in the amount of zero-emissions vehicle travel Promote an increase in the amount of ZEV miles traveled from a projected 4.5% to 25% of total 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. <i>(Short-term)</i>	During the previous reporting period, staff issued a Request for Information (RFI) for an off-grid PV powered EV charging station. Staff desired to explore innovative solutions that exceeded current market products, but the three proposals received were for “off-the-shelf” products. Staff continues to assess the feasibility of a direct "PV to EV" pilot project(s). <i>(In progress, delayed)</i>
L-2	Prepare a community-wide charging station siting plan, which evaluates site visibility and exposure, EV driving ranges, high volume destinations, locations with high ownership or interest in EVs, and cost of construction. <i>(Short-term)</i>	Staff continues to utilize the completed EV charging station site analysis to select locations for future charging stations. <i>(Complete)</i>
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. <i>(Mid-term)</i>	During the reporting period, staff continued to evaluate funding opportunities to construct EV charging stations. Staff also worked with SDG&E to install EV charging infrastructure, including DC fast charging, for fleet vehicles; the City Council approval of these charging stations occurred after the reporting period concluded. <i>(In progress, on schedule)</i>
L-4	Offer dedicated ZEV parking, and provide charging stations adjacent to ZEV parking as identified in the community-wide charging station siting plan. <i>(Mid-term)</i>	An EV charging infrastructure ordinance was adopted by City Council as Ordinance No. CS-349, which requires new residential and nonresidential buildings, and major renovations to existing residential buildings, to install EV charging infrastructure. Staff continued to implement this ordinance during the reporting period. <i>(In progress, on schedule)</i>
L-5	Adopt requirements for ZEV parking for new developments. <i>(Short-term)</i>	On March 12, 2019, an EV charging infrastructure ordinance was adopted by City Council as Ordinance No. CS-349, which requires new residential and nonresidential buildings to install EV charging infrastructure. <i>(Complete)</i>

L-6	Implement and enforce Title 18, Chapter 18.21, Sections 18.21.140 and 18.21.150, mandating electric vehicle charging infrastructure in new residential and non-residential building and existing residential and non-residential buildings undergoing major renovations. <i>(Ongoing)</i>	Staff continued to implement the EV charging infrastructure ordinance adopted by City Council as Ordinance No. CS-349, which requires new residential and nonresidential buildings, and major renovations to existing residential buildings, to install EV charging infrastructure. Staff also prepared an EV Charging Station Ordinance, Permit Application, and Information Bulletin to explain the expedited permitting process. <i>(In progress, on schedule)</i>
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% of all city-related VMT by 2035. <i>(Short-term)</i>	Staff continued to implement the fleet conversion plan. On Oct. 13, 2021, Administrative Order #3 (Fleet Management Program) was updated to include a vehicle acquisition policy to require the purchase of low and zero-emission vehicles where feasible. Since April 2020, total of 31 hybrid patrol vehicles have now traveled a combined total of 650,000 miles, resulting in lifetime savings of 30,000 gallons of fuel when compared to the 2019 non-hybrid counterpart patrol vehicles. These fuel savings resulted in a reduction of 584,000 lbs (or 265 MT) of CO ₂ . During the reporting period, a total of 24 city vehicles were replaced with hybrid alternatives, and one city hybrid vehicle was replaced with a plug-in hybrid alternative. <i>(In progress, on schedule)</i>
M - Develop more citywide renewable energy projects Produce an equivalent amount of energy to power 2,000 homes (roughly equivalent to a 5% reduction) by 2035 from renewable energy projects.		
M-1	Conduct a feasibility study to evaluate citywide renewable energy projects and prioritize accordingly. <i>(Short-term)</i>	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. <i>(Complete)</i>
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. <i>(Mid to Long-term)</i>	In accordance with the city's solar PV ordinance, future city facilities will be required to incorporate renewable energy. The potential for retrofitting PV on existing buildings is evaluated when other improvements and/or renovations are planned. <i>(In progress, on schedule)</i>
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. <i>(Mid to Long-term)</i>	City staff continually monitors potential funding sources to support CAP implementation, including renewable energy projects. <i>(In progress, on schedule)</i>
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 8% by 2035.		

N-1	Improve water utilities (including water supply, wastewater, and recycled water) conveyance, treatment and distribution, and other system improvements. <i>(Mid to Long-term)</i>	<p>Incorporating energy efficiency into system improvements is standard practice for Carlsbad Utilities, which analyzes energy usage of their pumps and endeavors to increase energy efficiency of equipment whenever it is replaced. Carlsbad Utilities anticipates including a supplemental budget request for fiscal year 2022-23 to replace soft start electrical components to use wastewater pumps in an energy efficient manner.</p> <p>The potable water distribution system is almost completely gravity-fed. Specifically, CMWD receives treated water from the San Diego County Water Authority at the highest point in the system and uses gravity instead of electric pumps to move it downhill to customers throughout the city. <i>(In progress, on schedule)</i></p>
<p>O - Encourage the installation of greywater and rainwater systems Encourage the installation of greywater and rainwater collections systems with a goal of 15% of homes by 2035.</p>		
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. <i>(Mid-term)</i>	<p>CMWD participated in a rain barrel rebate program with other north San Diego County water districts to encourage and provide financial incentive for rainwater collections systems. Details on the program can be found at: http://www.solanacenter.org/PURCHASE-RAIN-BARREL</p> <p>Carlsbad Utilities posted information on greywater systems on its website at: https://www.carlsbadca.gov/departments/utilities/water/gray-water. <i>(Complete)</i></p>
O-2	Create a greywater design reference manual, or provide links to an existing one, for the design of greywater and rainwater collection systems. <i>(Mid-term)</i>	Staff will be updating the Utilities website to include a link to the County of San Diego’s greywater design manual; this update will occur just outside of this reporting period. <i>(In progress, on schedule)</i>
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. <i>(Mid-term)</i>	Staff began evaluating the feasibility of this measure, but there are remaining legal questions around its funding. <i>(In progress, on schedule)</i>
<p>P – Increase the proportion of clean electricity in community energy consumption Achieve 100% renewable electricity by 2030 for 95% of the residential bundled load and 85% commercial + industrial bundled load.</p>		
P-1	Continue participation in the Clean Energy Alliance (CEA) Community Choice Energy program. <i>(Ongoing)</i>	The city continued participation in CEA, which launched in May 2021. <i>(In progress, on schedule)</i>
P-2	Explore the purchase of renewable energy credits if Community Choice Energy program is not reaching 2035 goal.	Staff will monitor program participation and implement this action if necessary. <i>(Not started)</i>