5 Revisions to the Climate Action Plan

PROPOSED CLIMATE ACTION PLAN REVISIONS

Chapter 2: Emissions Inventory

Page 2-5

Add footnote to end of first paragraph on Solid Waste, as follows:

> In November 2014, city staff contacted the County of San Diego Public Works Department in response to a comment on the draft CAP. County staff reported that for 2011, it calculated GHG emissions from Palomar landfill at 6,703 MTCO2e. Although it is unknown why the reported figure is higher than the assumed figure for the city's GHG inventory update, County staff did note that their GHG calculation methodology had changed in 2010. The difference in the County's calculations of GHG emissions from Palomar landfill does not have a material effect on the assumptions, conclusions, or recommendations of this CAP.

Chapter 3: Greenhouse Gas Reduction Target, Forecasts, and Emissions "Gap"

Correct table numbering and references to Tables 3-8 through 3-14 as Tables 3-7 through 3-13.

3.6 Modified Baseline: GHG Reductions from Additional General Plan Policies and Actions

Pages 3-16 through 3-24

Modify Section 3.6 as follows:

METHODOLOGY

This section describes General Plan policies and actions that reduce GHG emissions, quantifies emissions reductions, and explains how these policies and actions will be implemented. These reductions are from policies and actions in addition to Pavley I, the RPS, and the General Plan

land use and circulation system, which incorporate reductions from "No Project" conditions which are already reflected in the SANDAG modeling discussed previously. The General Plan policies and actions are organized according to the following categories:

- Bikeway System Improvements
- Pedestrian Improvements and Increased Connectivity
- Traffic Calming
- Parking Facilities and Policies
- Transportation Improvements

The California Air Pollution Control Officers Association's (CAPCOA's) Quantifying Greenhouse Gas Mitigation Measures report was developed as a resource for local governments to assess emissions reductions from GHG mitigation measures. This section uses the methodology outlined in the CAPCOA report for each category to quantify emissions reductions from the General Plan policies and actions.[1] The reductions are applied to the community forecast in the following section to get the "modified baseline" forecast.

Bikeway System Improvements

Bikeway System Improvements	*General Plan Policies:* *2-P.22, 2-P.23, 2-P.43, 2-P.44, 2-P.51~~, 2-P.85~~; 3-P.6, 3-P.11, 3-P.12, 3-P.13, 3-P.16, 3-P.17, 3-P.18, 3-P.20, 3-P.21, 3-P.22, 3-P.23, 3-P.24, 3-P.25, 3-P.27, 3-P.28, 3-P.29, 3-P.30, 3-P.36; 4-P.39*	2020 Reduction: **164 $MTCO_2e$** 2035 Reduction: **147 $MTCO_2e$**

Policy/Action Description

The Carlsbad Bikeway~~cycle~~ Master Plan, referenced in the General Plan, recommends the enhancement of the existing bicycle network with the implementation of ~~approximately 6.5 miles of~~ new Class I bike paths, ~~2.8 miles of~~ new Class II bike lanes, and ~~4.2 miles of~~ new Class III bike routes, resulting in a 111.5 mile bikeway system. The planned bikeways include the Coastal Rail Trail, a Class I bike path on Carlsbad Boulevard at Ponto, two Class II bike lanes – one on Hillside Drive and another on Avenida Encinas, and five Class III bike route projects in the northwest quadrant of the city.

In addition to Bikeway Master Plan recommendations~~Additionally~~, the Mobility Element identifies the following new connections to improve connectivity in the area:

- A new Class I trail at the terminus of Cannon Road and extending eastward toward the City of Oceanside

[1] While many of the policies and actions quantified in the report are project-level in nature, much of the supporting literature is from studies on a citywide, countywide, or regional context. The methodology in this section is based on these regional studies, which is therefore applicable to the General Plan policies and actions listed in this section.

- A new Class I trail along the Marron Road alignment between El Camino Real and the City of Oceanside
- A new crossing of the railroad tracks at Chestnut Avenue.

Also, CalTrans' North Coast Corridor Public Works Plan includes, among other improvements, a new North Coast Bike Trail and new bicycle/pedestrian connections across Batiquitos and Agua Hedionda Lagoons.

Finally, the~~In total, the recommended enhancements will create a total of 13.5 miles of new bike paths, to result in a total of 111.5 miles of bike paths.~~ city can install new and enhanced bicycle facilities as opportunities arise in conjunction with street maintenance and rehabilitation, and as part of "road diet" projects.

Quantification

An estimated 0.05 percent reduction in transportation GHG emissions is assumed to occur for every 2 miles of bike lane per square mile in areas with density greater than 2,000 people per square mile.[2] Carlsbad currently has approximately 2,700 people per square mile, greater than the threshold of 2,000 people per square mile.

With the ~~total bicycle improvements~~ 111.5 miles of bicycle facilities, there would be approximately 2.85 miles of bikeways ~~lanes~~ per square mile, which corresponds to a 0.07 percent reduction in VMT emissions, or about 164 $MTCO_2e$ in 2020, and 147 $MTCO_2e$[3] in 2035.

Implementation

The bikeway system enhancements will occur incrementally (at approximately .6 miles/ year) through the implementation of the ~~Carlsbad Bicycle Master Plan and the~~ General Plan and planned and opportunistic bikeway improvements (e.g., in conjunction with street maintenance and rehabilitation, or as part of a "road diet"). Improvements will be funded and/or installed as conditions on new private development as well as through the city's multi-year CIP and annual operating budget process. Funding sources may include development impact fees, general funds, local, state, and federal grants.

Pedestrian Improvements and Increased Connectivity

Pedestrian Improvements and Increased Connectivity	*General Plan Policies:* *2-P.22, 2-P.23, 2-P.43, 2-P.44, 2-P.45, 2-P.46, 2-P.48, 2-P.51, 2-P.68, 2-P.75~~, 2-P.85~~; 3-P.6, 3-P.12, 3-P.13, 3-P.16, 3-P.17, 3-P.18, 3-P.20, 3-P.21, 3-P.22, 3-P.23, 3-P.24, 3-P.25, 3-P.27, 3-P.28, 3-P.29, 3-P.36; 4-P.39*	2020 Reduction: **2,341 $MTCO_2e$** 2035 Reduction: **2,106 $MTCO_2e$**

[2] Cambridge Systematics. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute.

[3] In this chapter, reductions based on a portion of VMT have lower reductions in 2035 than in 2020 because they are assumed to decrease with greater vehicle efficiency standards over time.

Policy/Action Description

Pedestrian Improvements

Carlsbad has adopted several programs and plans related to improving the walking environment. The city's Pedestrian Master Plan guides the future development and enhancement of pedestrian facilities to ensure that walking becomes an integral mode of transportation in Carlsbad. The Carlsbad Residential Traffic Management Program provides a mechanism for community members to report issues relating to speeding and traffic volumes on residential roadways, assisting the city in "calming" traffic in these areas to make them more comfortable for pedestrian travel.

Physical barriers to pedestrian access include gaps in sidewalks, high-volume, high-speed streets, a circuitous roadway system in several parts of the city, and regional infrastructure such as freeways and railways that presents barriers to pedestrian mobility. There are four significant concentrations of high pedestrian improvement needs across the City of Carlsbad, including the following locations:

- The entire northwest quadrant, especially the Carlsbad Village area
- The southern coastal area along Carlsbad Boulevard, between Cannon Road and La Costa Avenue
- Several locations along El Camino Real, near Camino Vida Roble, Aviara Parkway/Alga Road and La Costa Avenue
- The southeastern portion of the city, stemming from the intersection of La Costa Avenue and Rancho Santa Fe Road

A range of potential improvement projects exists throughout the city, as identified in the pedestrian master plan, to enhance pedestrian mobility, local connectivity, usage, safety and accessibility. These improvements include filling in gaps in sidewalk connectivity, upgrading substandard sidewalks, creating new connections to pedestrian attracting designations (such as access across the railroad track to the beach at Chestnut Avenue, for example), establishing safe routes to school, enhancing crosswalks, installing pedestrian countdown signals, improving signage, and providing ADA improvements.

Increased Connectivity

Increasing connectivity in the city is critical to achieving the Carlsbad Community Vision. There are a number of improvements described in the General Plan that will enhance connectivity for bicycles and pedestrians, as noted below:

- Cannon Road east of College Boulevard – Provide a bicycle/pedestrian facility that would begin at the current eastern terminus of Cannon Road and continue eastward to the city's eastern boundary.

- Marron Road Connection – Provide a bicycle/pedestrian facility that would begin at the current eastern terminus of Marron Road and extend eastward to the city's eastern boundary.
- Additional crossings of Interstate-5 and the railroad – Continue to look for opportunities to add crossings of these two barriers and improve east-west connectivity to and from the coast. Key connections will include a crossing at Chestnut Avenue (bicycle, pedestrian, and vehicular) under the freeway and (bicycle and pedestrian) across the railroad, and a Chinquapin Avenue connection (bicycle, pedestrian, and vehicular) over the freeway and (bicycle and pedestrian) across the railroad. Additionally, Caltrans is designing a number of new pedestrian and bicyclist connections along and across Interstate-5 and near the lagoons as part of the Interstate-5 North Coast Corridor Public Works Plan. The city will continue to coordinate with Caltrans on these improvements.
- Improved accessibility to the lagoons and to the coast are envisioned to improve connectivity to those areas.

Quantification

Providing an improved pedestrian network and increasing connectivity encourages people to walk more and results in people driving less, causing a reduction in VMT. An estimate of a 1 percent reduction in VMT from pedestrian improvements and connectivity was assumed[4], which corresponds to a reduction of 2,341 $MTCO_2e$ in 2020 and 2,106 $MTCO_2e$ in 2035.

Implementation

Pedestrian improvements and increased connectivity will occur through implementation of the Pedestrian Master Plan, the Residential Traffic Management Program, and the General Plan~~,~~ ~~-~~and through planned and opportunistic pedestrian improvements (e.g., in conjunction with street maintenance and rehabilitation, or as part of a "road diet"). Improvements will be funded and/or installed as conditions on new private development as well as through the city's multi-year CIP and annual operating budget process. Funding sources may include development impact fees, general funds, local, state, and federal grants.

Traffic Calming

Traffic Calming	*General Plan Policies:* *2-P.51; 3-P.12, 3.P-13*	2020 Reduction: **585 $MTCO_2e$** 2035 Reduction: **526 $MTCO_2e$**

Policy/Action Description

The Carlsbad Residential Traffic Management Program provides a mechanism for community members to report issues relating to speeding and traffic volumes on residential roadways, assisting the City in "calming" traffic in these areas to make them more safe and comfortable for pedestrian travel. Traffic calming devices include speed tables, speed bumps, roundabouts, and

[4] Center for Clean Air Policy. Transportation Emission Guidebook. http://www.ccap.org/safe/guidebook/guide_complete.html.

other devices that encourage people to drive more slowly or to walk or bike instead of using a vehicle, especially for short trips in and around residential neighborhoods. The residential traffic management program is implemented by the Transportation Division and funded through the annual budget appropriation process.

Quantification

CAPCOA's "Quantifying Greenhouse Mitigation Measures" was used to quantify the effect of traffic calming devices. A 0.25 percent reduction in VMT was assumed to occur from these improvements, which corresponds to a reduction of 585 $MTCO_2e$ in 2020 and 526 $MTCO_2e$ in 2035.

Implementation

The traffic calming improvements will occur through the implementation of the Residential Traffic Management Program and the General Plan.

Parking Facilities and Policies

Parking Facilities and Policies	*General Plan Policies:* *2-P.71, 2-P.79; 3-P.24, 3-P.34, 3-P.35, 3-P.36, 3-P.37*	2020 Reduction: **4,682 $MTCO_2e$** 2035 Reduction: **4,211 $MTCO_2e$**

Policy/Action Description

Getting parking right is critical to ensuring the success of any urban area. Inadequate parking is inconvenient and frustrating for businesses and residents. Too much parking underutilizes valuable land, results in lower density development, discourages use of other forms of transportation (such as public transit), spreads out land uses, and creates gaps in store fronts; thereby practically requiring the use of the automobile. Additionally, too much parking also requires more driveways for accessibility, introducing conflicts between pedestrians and vehicles. Overly high parking requirements—particularly in downtown areas or urban cores—can impact the ability to renovate or repurpose older buildings and revitalize activity centers that can be better served and connected by enhancing facilities and amenities for bicyclists and pedestrians. Therefore, it is important to "right size" and manage parking such that there is enough to support the needs generated by the use, but not so much that it wastes land and impairs other ways of getting around.

The city's Zoning Ordinance provides standards for parking facilities based on development types within the city. To promote "right sizing" of parking facilities, the following techniques are included as part of the General Plan Mobility Element:

- Shared Parking – continue to allow uses that have different parking demands at different times of the day to share the same parking facilities. This is an effective way to minimize pavement, allow denser land use, provide for more landscaping, and provide improved walkability within a mixed use area. The best example of shared parking is an office

building and an apartment building as office's peak parking demand occurs at 10:00 a.m. and apartment's peak parking demand occurs at 11:00 p.m.

- Collective Parking – allow uses in mixed use projects/areas to utilize up to 50 percent of project site's vacant on-street parking to count toward their parking supply requirements.
- Unbundled Parking – rather than provide free guaranteed parking, "unbundle" the parking from the development and require residents and/or employees to pay for use of a parking space.
- Park Once – a strategy in destination districts to enable visitors to "park once" and visit a series of destinations. Park once strategies work well in areas like the Village and areas that are well connected by pedestrian and bicycle facilities. The creation of centralized parking areas supports this strategy.
- In Lieu Parking Fees – continue strategies in appropriate areas by which developers can contribute fees toward the development of a common parking facility in lieu of providing on-site parking. This works best in downtown or concentrated commercial areas, works well to assist in paying for unified structured parking, and provides developers an opportunity to increase density on their parcels.
- Parking Management Strategies –a business district or businesses manage high demand parking locations and destinations through a number of different strategies including demand pricing, time restrictions, valet parking, and other techniques.
- Public-Private Partnerships –the city, business owners, and developers collaborate to provide both private and public parking opportunities. Instances where this works well include parcels owned by the city, where a private entity comes in and develops, manages, and enforces the parking in these public lots.
- Parking Locater Signs – electronic monitoring devices that identify the available parking in a given facility and utilize changeable message signs to assist travelers in identifying available parking locations. Please note that this may require modifications to the city's zoning ordinance to be implemented in some areas of the city.
- Parking Wayfinding Signs – signs identifying where public parking is available, which support the "park once" concept.
- Reduced Parking Standards – reduce parking standards in areas that are well served by transit, provide shuttle accessibility to the COASTER station, provide parking cash out programs (where employers pay employees to not park on site), or provide other programs that will reduce parking demand.
- Biking Equals Business Program – businesses provide bicycle parking or corrals and provide incentives to encourage their patrons and employees to ride rather than drive.
- Transit Equals Business Program – businesses provide their customers and employees incentives to encourage them to use transit rather than drive.
- Bicycle Corrals in Lieu of Vehicle Parking – for certain businesses, reduce required onsite parking for vehicles if they provide a bicycle corral that accommodates more people.

Although there are additional parking strategies that are available and may become available in the future, most of the strategies work best in smart growth/mixed use development areas and will be necessary to accomplish the goals and visions identified in the General Plan and the General Plan Mobility Element.

Quantification

According to CAPCOA's Quantifying GHG Mitigation Measures, parking strategies have estimated VMT reductions. Reduced parking standards and other policies reducing parking availability have an estimated 5 to 12.5 percent VMT reduction, unbundled parking cost has a 2.6 to 13 percent VMT reduction, and parking management strategies have a 2.8 to 5.5 percent VMT projection.[5] Conservatively assuming the combined effect of these parking reduction strategies would result in the lower end of the strategies results, and considering that the strategies would be most applicable in future growth and infill areas, the cumulative reduction from implementations would result in a 2 percent VMT reduction to give an estimated 4,682 $MTCO_2e$ reduction by 2020, and a 4,211 $MTCO_2e$ reduction by 2035.

Implementation

The parking strategies will occur through the implementation of the Zoning Ordinance and the General Plan. The city's Planning Division is primarily responsible for developing new ordinances and updating existing ones. Parking policy and ordinance changes would be carried out under the Planning division's annual budget authority.

Transportation Improvements

Transportation Improvements	*General Plan Policies:* *2-P.46, 2-P.68; 3-P.6, 3-P.15, 3-P.16, 3-P.23, 3-P.27, 3-P.28, 3-P.31, 3-P.32*	2020 Reduction: **1,475 $MTCO_2e$** 2035 Reduction: **1,327 $MTCO_2e$**

Policy/Action Description

Transit in Carlsbad includes bus service, ADA paratransit service, and the COASTER commuter rail; indirectly, transit service is also provided by the Sprinter light rail system, Amtrak rail service, and Metrolink commuter rail. Future transit service in the city will primarily be coordinated by the North County Transit District (NCTD). In addition, there are several planned transit improvements for Carlsbad that are part of San Diego Association of Governments (SANDAG) regional planning efforts. These are reflected in the General Plan Mobility Element:

- Coastal rail improvements are proposed for the tracks serving the COASTER and Surfliner trains in San Diego County along the Los Angeles to San Diego Rail Corridor. These proposed improvements include double tracking, bridge replacements, and station improvements. Improvements to the COASTER service (2020 and 2030) are also proposed and would increase service and reduce headways.

[5] The maximum reduction provided from the combination of all parking policies in the CAPCOA report is a 20 percent reduction in VMT

- Route 471 (2020) is a proposed rapid bus providing frequent service between Carlsbad and San Marcos via Palomar Airport Road. This route will operate with 10 minute headways during peak and off-peak hours. In the city, this rapid bus route is envisioned to be supported by signal priority at intersections.
- AMTRAK will add service to Carlsbad.
- As previously described, the above future transit improvements will continue to advance the backbone transit infrastructure. However, one key component to improving transit use is improving the "first mile/last mile" access and experience for transit users. This typically includes end of trip facilities (bike racks, showers, changing rooms, etc.) and better connectivity from the transit stop to the ultimate destination via bicycle facilities, pedestrian facilities, local transit circulators, etc.
- Carlsbad's future transit effectiveness will depend on major employers assisting with providing some of these "first mile/last mile" facilities through transportation demand management (TDM) measures. TDM is envisioned to include shuttle circulators to major employers and destinations, showers and changing rooms at those locations, and a host of other typical TDM techniques that would support transit usage and the connection to the ultimate destination. This Mobility Element also supports TDM through potential incentives (such as reduced parking standards for TDM implementation) to further support transit access to these destinations.
- The final component to improving transit use in the city is working with NCTD to improve the transit experience, particularly along the bus routes. This includes improving bus stops in the city to ensure that they are well lit, have seating, and are covered to protect users from inclement weather.

As part of the FY 2014-2015 capital improvement program, the city initiated work on a Coastal Mobility Readiness Plan. This plan will complement current and planned bicycle and pedestrian improvements by recommending policy, infrastructure and technology investments that will: improve accessibility to transit and para-transit services; fill in transportation gaps ("first mile-last mile" solutions); support and encourage expanded use of low-emission and zero emission vehicles; provide viable alternatives to private, single-occupant vehicle use (such as through car-sharing, bike-sharing, and local shuttles); and recommend other transportation/parking demand management strategies. The plan will emphasize efficiently connecting residents and visitors among the city's various coastal activity centers, beaches, the state campground, and to and from major hotels and resorts, the Village, major shopping centers, and other significant visitor-serving activity centers. The plan will identify effective, proven tools, and seek out promising and emerging technologies. The plan will also identify potential funding partners such as NCTD (e.g. Cooperative Agreements in accordance with NCTD Board Policy 22), private funding and/or public grants. The plan is expected to be completed at the end of 2015, with implementation beginning in 2016.

The city has also implemented a state-of-the-practice traffic signal management (TSM) system. This system integrates traffic signals in the city to a single access point, allowing city staff to monitor and update signal timings to improve safety and mobility for all users in the city. The Mobility Element supports further implementation of this program and use of other technologies

that become available, which have the ability to improve mobility for all users of the city's transportation system.

Quantification

Transportation system improvements can result in VMT reductions. According to CAPCOA's Quantifying Greenhouse Gas Mitigation Measures, transit system improvements can result in the following reductions: 0.02 to 3.2 percent VMT reduction from a bus rapid transit system, 0.1 to 8.2 percent VMT reduction from expanding the transit network, 0.02 to 2.5 percent VMT reduction from increasing transit service frequency and speed, and 0.5 to 24.6 percent VMT reduction from increasing transit accessibility. Reductions from TSM were estimated using Cambridge Systematics' Moving Cooler report as a 0.01 percent VMT reduction. Conservatively assuming the combined effect of these strategies, summing the low end of the VMT reduction ranges gives a 0.63 percent reduction in VMT emissions.

Implementation

Transit improvements will primarily be coordinated by NCTD and will also be implemented by SANDAG regional planning and funding efforts. City-led improvements will be carried out through the city's multi-year CIP and annual operating budget appropriation process.

RESULTS

Table 3-~~13~~ 12 shows the GHG reductions from each of the above General Plan policies and actions. The largest reduction comes from parking facilities and policies, followed by pedestrian improvement and increased connectivity, transportation improvements, traffic calming, and bikeway system improvements. VMT emissions are projected to fall in the future due to higher fuel efficiency standards; however, as the efficiency gains are expected to be largely achieved by 2020 but the VMT is projected to continue climbing in the future, the effect of the VMT reductions are greater in 2020 than in 2035 for all General Plan policies and actions considered in this section. For example, the reductions from traffic calming in 2035 are 526 $MTCO_2e$, which is less than the reduction in 2020 of 585 $MTCO_2e$. The reductions from these policies and actions are incorporated into the community emissions forecast in the following section.

Table 3-~~13~~12: GHG Reductions from Additional General Plan Policies and Actions

Year	*Bikeway System Improvements*	*Pedestrian Improvements and Increased Connectivity*	*Traffic Calming*	*Parking Facilities and Policies*	*Transportation Improvements*	*Total GHG Reductions from Additional General Plan Policies and Actions*
2020	164	2,341	585	4,682	1,475	9,247
2035	147	2,106	526	4,211	1,327	8,317

3.7 Modified Baseline and the GHG Emissions "Gap"

Page 3-24

Modify Table 3-14 as follows:

Table 3-~~14~~13: Modified Baseline Forecast (Forecast Community Emissions with General Plan Land Use and Roadways, State and Federal Actions, and Additional General Plan Policies and Actions)

Year	*Total Modified Baseline Forecast ($MTCO_2e$)*	*GHG Emissions Targets (Linear Scaling of AB 32/S-3-05) ($MTCO_2e$)*	*Emissions "Gap" ($MTCO_2e$)*
2020	473,082	535,763	Target Met
2025	467,018	464,328	2,690
2030	452,762	392,893	59,869
2035	455,556	321,458	134,098

Chapter 4: CAP GHG Reduction Measures

Pages 4-1 through 4-26

Modify Chapter 4 as follows:

CAP GHG REDUCTION MEASURES

The forecast emissions in Chapter 3 incorporate reductions from (1) state and federal actions, (2) General Plan land use and roadways, and (3) additional General Plan policies and actions. This chapter describes additional GHG reduction measures to close the emissions "gap" between emissions targets and forecast emissions for 2035. These are:

- Residential, commercial and industrial photovoltaic systems
- Building cogeneration
- Single-family, multi-family and commercial efficiency retrofits
- Commercial commissioning
- CALGreen building code
- Solar water heater/heat pump installation
- Efficient lighting standards
- Increased zero-emissions vehicle travel
- Transportation Demand Management (TDM)
- Citywide renewable projects
- Water delivery and conservation

The sections below describe the GHG reduction measures and explain how they will be implemented. The GHG reductions from these measures were quantified using the Energy Policy Initiatives Center (EPIC) mitigation calculator, a tool developed by the University of San Diego for cities within San Diego County. The EPIC mitigation calculator includes a "business as usual" (BAU) forecast for each measure estimating GHG reductions from trends already underway that will occur without any additional city intervention, based on regional San Diego Gas & Electric (SDG&E) forecasts. For example, under the BAU forecast for residential photovoltaic (PV) systems, the EPIC mitigation calculator estimates that by the year 2035, energy produced by residential PV systems in the City of Carlsbad will be about 15.9 megawatts (MW), which will offset about 6,233 metric tons CO_2e ($MTCO_2e$).

The GHG reduction measures describe goals, amount of reduction in 2035, and actions to meet the target levels. The actions are categorized as **short-term** actions that will be implemented within ~~(~~one to two years~~)~~ of CAP adoption~~;~~, or **mid-term** ~~(~~actions that will be implemented within two to five years of CAP adoption~~), or **long-term** (longer than five years), based on when they will be implemented following adoption of the CAP~~. Actions identified as **Short to Long-term**, or **Mid to Long-term** are those actions that will begin in the short or mid-term, but take longer than five years to fully implement. The mixture of short-term, mid-term, and long-term

actions presented for each measure are intended to meet the goals in a realistic timeframe and provide an effective combination to reach the targets set forth. The "already-projected" amount is based on the forecast BAU emissions reduction, followed by a target level to reach the goal of the measure. The measures are then described in greater detail, as is the method of quantifying the GHG emissions reduction, and the responsibility and implementation of the measure is discussed. Each measure qualitatively describes costs and benefits, both to the city and the private sector. Overall benefits of GHG emissions reductions include decreased costs through energy efficiency, reduced risk to human health and welfare, and less global climate change.

The GHG reduction mitigation measures identified in this chapter are expected to achieve the targeted emission reductions. However, the nature, location, timing, size and other characteristics of future development projects may vary widely and additional project-level mitigation measures may be helpful or necessary to assist individual projects to achieve the targeted reductions. Accordingly, Appendix E to this Climate Action Plan provides a non-exclusive list of mitigation measures to be considered by the City and project applicants during project-level environmental review and adopted as needed to ensure that individual development projects achieve the targeted emission reductions.

4.1 Residential, Commercial and Industrial Photovoltaic Systems

Measure A: Promote Installation of Residential Photovoltaic Systems	
Goal: Promote installation of residential PV systems to produce an additional 9.1 MW ~~per year~~ above already projected amounts, or the equivalent of 2,682 more homes with PV systems, by 2035.	2035 Reduction: 10,136 $MTCO_2e$
Actions: *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) *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) *A-3: ~~Evaluate the feasibility of a~~Adopt~~ing~~ an ordinance, similar to those passed by Lancaster and Sebastopol, which requires ~~all~~ new homes to install PV panels to offset a portion of their energy use.* (~~Mid~~Short-term)	

Already-Projected Amount: Solar photovoltaic (PV) systems convert solar energy into electricity. The projected power generation[6] of residential PV systems at 4,685 homes is 15.9 MW[7] in the year 2035, which is enough to fully power these homes.[8]

[6] The maximum amount of power produced is also referred to as solar capacity.

Target: The target is 25 MW in the year 2035, which is the equivalent amount of production to power 7,367 homes.[9]

GHG Reduction Measure Description: PV systems convert solar energy into electricity. Producing renewable energy locally through residential, commercial, and industrial PV systems reduces the need to construct costly new power plants that produce air pollution, use natural resources, and impact the environment.

The San Diego region has among the highest rates of solar energy production in the nation, producing an annual average of about 6.5 kWh per square meter per day, according to the National Renewable Energy Laboratories. A 2006 estimate[10] found that existing PV technology could supply over 100 percent of the peak electricity demands for San Diego County, and over half of the total energy load. Measure A is to promote the installation of PV systems on single-family and multi-family homes above the already-projected amount (4,685 homes) by an additional 2,682 homes, or a total of about 15 percent of homes.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure A.

Responsibility and Implementation: The City of Carlsbad currently participates in three Property Assessed Clean Energy (PACE) programs: CaliforniaFIRST, FigTREE, and California HERO. PACE programs provide financing to eligible property owners for sustainable energy projects, thereby offering a source of funding for residential PV systems. Property owners can finance PV system installations and energy efficiency improvements through a voluntary assessment on their property tax bills. Several other financing options are available to residents, including Federal Housing Financing Administration- (FHFA) insured Energy Efficient Mortgages, HUD Title 1 Home Improvements Loans, and FHA PowerSaver Loans.

The city will temporarily suspend residential and commercial solar PV system permit fees. The city will also on a continuing basis ensure that regulatory provisions—such as complying with regulations for zoning, structure height, permit submittal and review process, etc.—do not hinder PV panel installation.

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[7] Solar capacity (MW) was converted into an annual energy total (kWh per year) as follows: The standard assumption is about 5 hours of production per day per solar system. The capacity was multiplied by 5 hours per day times 365 days per year to get a total production in kWh per year. Therefore, 15.9 MW converts to 29,017,500 kWh per year.

[8] Average household energy use was calculated as follows: The California per capita electricity use in 2010 was 2,337 kWh (source: http://www.eia.gov/state/?sid=CA). The average household size in 2010 was 2,65 people per household (source: http://www.census.gov/newsroom/releases/archives/2010_census/cb11-cn137.html). Therefore, the average household energy use in 2010 was: 6,193.1 kWh per year.

[9] It was assumed that residential PV systems produce the equivalent amount of energy to the amount consumed in each household on an annual basis.

[10] Anders, Scott and Bialek, Tom. 2006. Technical Potential for Rooftop Photovoltaics in the San Diego Region. Available: http://www.sandiego.edu/documents/epic/060309_ASESPVPotentialPaperFINAL_000.pdf.

Costs and Benefits:

Private: Private costs would come from the installation and maintenance of a residential PV system, which can be supported by PACE programs and other incentives. Benefits would accrue from reduced energy bills and increased property values.

City: City costs would occur from the analysis of potential regulatory barriers and ~~the evaluating the feasibility of~~adopting an ordinance requiring new homes to install PV systems. Revenue would be lost when permit fees are temporarily suspended.

Measure B: Promote Installation of Commercial and Industrial Photovoltaic Systems	
Goal: Promote installation of commercial and industrial PV systems to produce an additional 10.7 MW per year above projected amounts, or roughly 15 percent of projected commercial and industrial electricity use, by 2035.	2035 Reduction: 13,336 $MTCO_2e$
Actions: (*See also actions A1 and A2 above).* *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).* (~~Mid~~Short-term) *B-2: ~~Evaluate the feasibility of A~~adopt~~ing~~ an ordinance requiring existing nonresidential developments to install PV panels to offset a portion of their energy use.* (Mid-term)	

Already-Projected Amount: The projected power generation from commercial and industrial PV systems is 22.3 MW in the year 2035, which is about 30 percent of projected commercial and industrial electricity use.

Target: The target is the PV production of 33 MW in the year 2035, which is the equivalent amount of power production to supply about 45 percent of projected commercial and industrial demand.

GHG Reduction Measure Description: Photovoltaic (PV) systems convert solar energy into electricity. Measure B promotes the installation of PV systems on commercial buildings and industrial facilities above the already-projected amount of 22.3 MW, by an additional 10.7 MW. Together with the already-projected amount of power generation, Measure B would reach the target PV production of 33 MW in 2035.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure B.

Responsibility and Implementation: See Measure A (above) for implementation.

Costs and Benefits:

Private: Private costs would result from the installation and maintenance of commercial and industrial PV systems. Benefits would accrue from reduced energy bills and increased property values.

City: City costs would occur from removing potential regulatory barriers and preparing and enforcing a nonresidential PV systems ordinance. Revenue would be lost when permit fees are temporarily suspended.

4.2 Building Cogeneration

Measure C: Promote Building Cogeneration for Large Commercial and Industrial Facilities	
Goal: Promote building cogeneration for large commercial and industrial facilities, with the goal of producing 6.9 MW.	2035 Reduction: 1,067 $MTCO_2e$
Actions: *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) *C-2: Install cogeneration systems on large 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) *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)	

Already-Projected Amount: The forecast capacity of building cogeneration systems is 6.9 MW in the year 2035.

Target: The target is to reach the already-projected amount.

GHG Reduction Measure Description: Building cogeneration, also known as combined heat and power (CHP), is the use of building power stations to simultaneously generate electricity and heat. Instead of purchasing electricity from a utility and burning fuel in an on-site furnace to produce needed heat, an industrial or commercial user can use building cogeneration to provide both electricity and heat in one energy-efficient step. Examples of facilities able to use building cogeneration include manufacturing plants, hospitals, water and wastewater treatment facilities[11], and large office buildings.

Building cogeneration reduces building energy costs, provides stability in the face of uncertain electricity prices, and enhances energy reliability. Building cogeneration also provides the opportunity to improve critical infrastructure resiliency, by allowing critical facilities to run

[11] The Encina wastewater treatment plant operates a cogeneration plant that produces over 60 percent of the electricity used by the facility.

without any interruption in service if the electrical grid is impaired. Measure C is to promote the installation of building cogeneration systems on large commercial and industrial facilities to reach the projected capacity of 6.9 MW by 2035.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure C.

Responsibility and Implementation: The City of Carlsbad will apply for funding to install cogeneration systems on city facilities that would benefit from the use of these systems. The city will also publicize incentives for the construction of cogeneration systems, and require cogeneration systems for new construction and retrofits of large commercial and industrial facilities through the permitting process, where the facility has on-site non-renewable electricity generation.

A number of funding sources exist to provide financial support for the installation of cogeneration systems. Funding for cogeneration systems for city facilities is available through the Energy Efficiency Financing for Public Sector Projects program. In addition to city government buildings, the program also applies to schools and other public or institutional facilities. There is no minimum loan amount, but the maximum loan amount per application is $3 million. The interest rate is 1 percent, and loans must be repaid from energy cost savings within 15 years, including principal and interest. As well, the city will consider use of its Infrastructure Replacement Funds (IRF) to install feasible cogeneration systems as part of refurbishment of existing city facilities.

The Self-Generation Incentive Program (SGIP) provides financial incentives for the installation of new qualifying technologies, including cogeneration, that are installed to meet all or a portion of the electric energy needs of a facility.[12] SGIP is funded by the California Public Utilities Commission, and administered by the California Center for Sustainable Energy in SDG&E's service area. San Diego's 2014 share is approximately $10 million per year. Under the SGIP program, cogeneration systems receive an incentive of $1.83 per watt produced. SDG&E also offers seminars on the benefits of cogeneration and fuel cell options for large facilities.

For cogeneration systems that produce electricity in excess of the facility's needs, the state of California has initiated a feed-in tariff, which provides a cost-based price for renewable energy produced.

Costs and Benefits:

Private: Private costs would come from the installation and maintenance of building cogeneration systems, and which could be reduced through funding programs, such as SGIP. Benefits would accrue from reduced energy bills and increased property values.

[12] See the 2014 Self-Generation Incentive Program Handbook. Available: https://www.selfgenca.com/documents/handbook/2014

City: City costs would come from promoting cogeneration systems, and incorporating the consideration of cogeneration into the permitting process for commercial and industrial facilities. Benefits could accrue from reduced energy bills for city facilities that utilize cogeneration systems.

4.3 Single-family, Multi-family, Commercial, and City Facility Efficiency Retrofits

Measure D: Encourage Single-Family Residential Energy Efficiency Retrofits	
Goal: Encourage single-family residential efficiency retrofits with the goal of a 50 percent energy reduction compared to baseline in 30 percent of the total single-family homes citywide by 2035 (approximately ~~5~~10,000 single-family homes out of a total of ~~17~~35,000).	2035 Reduction: 1,132 $MTCO_2e$
Actions: *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) *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) *D-3: Adopt a residential energy conservation ordinance, which requires residential property owners to conduct and disclose an energy audit at the time of -renovations over $50,000, 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 weather stripping.* (~~Mid~~Short-term)	

Already-Projected Amount: There is no projection for retrofits that would occur without this measure.

Target: The target is a 50 percent energy reduction in 30 percent of single-family homes citywide by the year 2035.

GHG Reduction Measure Description: As single-family homes use a large portion of the city's total energy and older homes are substantially less efficient than newly constructed homes, there is a large opportunity to reduce GHG emissions through the retrofitting of existing homes. When a single-family homeowner seeks to make improvements over $50,000 in valuation, the owner would be required to conduct an energy audit, and meet low-cost energy efficiency measures—such as improving insulation, providing weather stripping, promoting natural lighting and ventilation, and using "smart" thermostats to regulate energy use for heating and cooling.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure D.

Responsibility and Implementation: Homeowners would implement this measure. SDG&E offers a Residential Energy Efficiency Program, which offers residential customers rebates to improve the efficiency of appliances, such as water heaters, washers, refrigerators, air

conditioners, building insulating, and ceiling fans. The City will publicize this and related programs on its website and by other means.

Costs and Benefits:

Private: Private costs would come from homeowners conducting energy audits and implementing efficiency retrofits. The cost of these retrofits is frequently 1 percent or less of the total renovation cost. Benefits would occur through reduced energy costs. Rebates are available as described above.

City: City costs would come from promoting incentive programs, creating an "Energy Challenge" program, and adopting and enforcing a residential energy conservation ordinance.

Measure E: Encourage Multi-Family Residential Efficiency Retrofits	
Goal: Encourage multi-family residential efficiency retrofits with the goal of a 50 percent energy reduction in 30 percent of the projected amount of multi-family homes citywide by 2035 (approximately ~~10~~5,000 out of a total of ~~35~~17,000).	2035 Reduction: 351 $MTCO_2e$
Actions: *See Measure D (above).*	

Already-Projected Amount: There is no projection for retrofits that would occur without this measure.

Target: The goal is a fifty percent energy reduction in thirty percent of the projected amount of multi-family homes citywide by the year 2035.

GHG Reduction Measure Description: Multi-family residential retrofits provide an opportunity to reduce building energy use. Multi-family residential retrofits are similar to the single-family retrofits described in Measure D, but can provide increased energy savings; for example, increasing insulation between residential units benefits both units. Other examples of multi-family residential retrofits include replacing incandescent and halogen lamps with LED or CFL lamps, installing energy-efficient windows and efficient appliances, and using "smart" thermostats to regulate energy use for heating and cooling.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure E.

Responsibility and Implementation: Multi-family residential unit owners would implement this measure. SDG&E offers a Residential Energy Efficiency Program, which offers residential customers rebates to improve the efficiency of appliances, such as water heaters, washers, refrigerators, air conditioners, building insulating, and ceiling fans. The City will publicize this and related programs on its website and by other means.

Costs and Benefits:

Private: Private costs would come from multi-family residential unit owners conducting energy audits and implementing efficiency retrofits. Benefits would occur through reduced energy costs. Rebates are available as described above.

City: City costs would come from promoting incentive programs, and creating an "Energy Challenge" program.

Measure F: Encourage Commercial and City Facility Efficiency Retrofits	
Goal: Encourage commercial and city facility efficiency retrofits with the goal ~~of~~ equivalent to a 40 percent energy reduction in 30 percent of commercial square footage citywide and in city facilities by 2035.	2035 Reduction: 18,377 $MTCO_2e$
Actions: *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 the most substantial energy savings.* (Short-term) *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) *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 the time of conducting renovations over $50,000 in valuation.* (~~Mid~~Short-term)	

Already-Projected Amount: There is no projection for retrofits that would occur without this measure.

Target: The target is equivalent to a ~~forty~~ 40 percent energy reduction in ~~thirty~~ 30 percent of the projected amount of commercial square footage and in city facilities.

GHG Reduction Measure Description: Relatively straightforward fixes to commercial and city-owned buildings can significantly reduce spending on fuel and electricity for commercial buildings. Examples of retrofits include installing efficient boilers and equipment, installation of high-quality windows, efficient lighting, and other building energy improvements.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure F.

Responsibility and Implementation: Building owners would implement this measure for commercial buildings.[13] Funding is available through incentive and rebate programs, such as

[13] AB 1103, the California Nonresidential Building Energy Use Disclosure Program, requires an owner of a nonresidential building to benchmark the building's energy use data and disclose the energy use prior to the sale of

SDG&E's Energy Efficiency Business Rebates and Incentives Program. SANDAG is preparing an Energy Roadmap for the city, which will identify energy conservation measures the city can use to reduce energy use in city municipal operations.[14] Funding for city retrofits can be provided through the Energy Efficiency Financing for Public Sector Projects program, described above in Measure C. As well, the city will use its IRF to install energy efficiency retrofits as part of refurbishment of existing city facilities.

Costs and Benefits:

Private: Private costs would come from building owners and business owners implementing efficiency retrofits. Benefits would occur through reduced energy costs. Costs could be offset through incentive and rebate programs.

City: City costs would come from retrofitting city facilities, providing resources to help guide building owners to implement this measure, promoting available incentive and rebate programs, and adopting and enforcing a commercial energy conservation ordinance.

4.4 Commercial and City Facility Commissioning

Measure G: Promote Commercial and City Facility Commissioning	
Goal: Encourage commercial and city facility commissioning, or improving existing and new building operations, with the goal ~~of~~ equivalent to a 40 percent energy reduction in 30 percent of commercial square footage citywide and in city-owned buildings by 2035.	2035 Reduction: 18,377 $MTCO_2e$
Actions: *G-1: Promote commissioning programs on the city's website such as San Diego RCx, and similar programs for commercial buildings.* (Short-term) *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)*	

Already-Projected Amount: There is no projection for commercial commissioning that would occur without this measure.

Target: The target is equivalent to a 40 percent energy reduction in 30 percent of existing and new commercial square footage citywide and in city facilities.

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the building, or the lease and financing of the entire building. This benchmark data can be used to guide implementation of efficiency measures for buildings renovated after a recent sale.

[14] SANDAG. 2014. "Energy Roadmap for Local Governments." Available: http://www.sandag.org/index.asp?classid=17&projectid=373&fuseaction=projects.detail. Accessed: February 25, 2014.

GHG Reduction Measure Description: Commercial commissioning is a systematic process of ensuring that a building performs according to its design and the occupant's operational needs. Commissioning allows the design developed to be successfully constructed and operated. Examples includes measuring temperatures and flow rates from heating, ventilation, and air conditioning (HVAC) systems to calibrate to a known standard, as well as reviewing operations to verify that controls are properly functioning.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure G.

Responsibility and Implementation: The City is responsible for commissioning city facilities. Building owners would implement this measure for commercial buildings. Programs exist to offer assistance with the commissioning. San Diego RCx, a SDG&E program, provides a free engineering study to qualified buildings to identify opportunities to save energy. After opportunities are identified, the program offers financial assistance to help pay the cost of implementing measures, which are typically low or no cost. Once implementation is complete, energy savings are confirmed with the utility, and the program pays the building owner the cost of the improvements. Commissioning of existing city facilities can occur concurrently with the 10-year master refurbishments schedule, using IRF.

Costs and Benefits:

Private: Private costs would come from building owners paying for building commissioning, which may be offset entirely through commissioning programs. Benefits would occur through reduced energy costs.

City: City costs would come from commissioning city facilities and from promoting commissioning programs to help guide building owners to implement this measure. Benefits would occur through reduced energy costs.

4.5 Green Building Code

Measure H: Implement Green Building Measures	
Goal: Implementation of a 5 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.	2035 Reduction: 179 $MTCO_2e$
Action: *H-1: Adopt residential and commercial energy conservation ordinances requiring a 5 percent improvement in energy efficiency for residential and nonresidential new construction, above the existing City of Carlsbad green building code.* (Short-term)	

Already-Projected Amount: There are no projections for this measure.

Target: The target is a five percent improvement in energy efficiency above the mandatory requirements set in CALGreen.

GHG Reduction Measure Description: CALGreen, also known as Title 24, is California's Building Energy Code. CALGreen requires that new buildings reduce water consumption, increase system efficiencies, divert construction waste from landfills, and install low pollutant-emitting finish materials. CALGreen has mandatory measures that apply to nonresidential and residential construction. The most recent CALGreen code was adopted in 2013 and became effective in 2014. This measure applies a five percent improvement in energy efficiency above CALGreen as part of a local Green Building Code.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure H.

Responsibility and Implementation: The City of Carlsbad shall adopt a Green Building Code with a standard of five percent improvement in energy efficiency above CALGreen, which would also apply to any subsequent updates of the CALGreen Building Code. The Green Building Code would apply to new construction within the city.

Costs and Benefits:

Private: Private costs would occur in implementing the improvements in energy efficiency above the CALGreen code in new construction.

City: There is no cost to the City of Carlsbad, other than adopting the ordinance.

4.6 Efficient Lighting Standards

Measure I: Promote Replacement of Incandescent and Halogen Bulbs with LED or Other Energy Efficient Lamps	
Goal: Replace 50 percent of incandescent and halogen light bulbs citywide with LED or similarly efficient lighting by 2035.	2035 Reduction: 21,900 $MTCO_2e$
Actions: *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) *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) *I-3:* *Evaluate the feasibility of adopting a minimum natural lighting and ventilation standard, developed based on local conditions. Demonstrate natural lighting and ventilation features in future city facility upgrade or new construction.* (Mid-term)	

Already-Projected Amount: There are no projections for this measure.

Target: The target is to replace 50 percent of incandescent and halogen bulbs citywide with LED bulbs or similarly efficient lighting by 2035.

GHG Reduction Measure Description: Replace inefficient incandescent and halogen light bulbs with more efficient light bulbs to reduce the amount of energy needed to power the bulbs, which will reduce the demand for electricity and thus the amount of GHG emissions created by the electrical power generation. Under AB 1109 (2007), minimum energy efficiency standards are structured to reduce statewide electrical consumption by 50 percent or greater from 2007 levels for indoor residential lighting and by 25 percent or greater from 2007 levels for indoor commercial and outdoor lighting by 2018. The improved efficiency standards from AB 1109 will help to meet the goals of this measure. SANDAG is preparing an Energy Roadmap for the city, which may include lighting replacement recommendations for city facilities. Either the measures in the Energy Roadmap or the goal of 50 percent of incandescent and halogen light bulbs will be followed for city facilities, whichever results in greater energy savings. For existing city facilities, the city will also time the lighting efficiency replacements with the master refurbishment schedule.

Quantification of GHG Emissions Reductions: An estimated 17 percent of residential and commercial energy nationwide[15] and about 25 percent in California[16] is used for lighting. Applied to citywide energy use, 25 percent corresponds to about 78,000 $MTCO_2e$ of forecast emissions in 2035 (from the SEEC community forecast with General Plan land use and roadways). LED light bulbs reduce energy consumption and therefore GHG emissions by 75 percent[17] compared to incandescent lighting. This measure assumes that about 75 percent of the bulbs citywide are currently incandescent or halogen, and sets the target of replacing half of these bulbs[18] with more efficient ones by 2035. New construction could set at a goal of 75 percent of bulbs to be LED or similarly efficient. This would overall lead to a 28 percent[19] decrease in emissions compared to halogen/incandescent bulbs, which equates to emissions reductions of 21,900 $MTCO_2e$.

Responsibility and Implementation: Carlsbad's street lights were replaced in 2011 with energy-saving induction units, leading to a reduction of approximately 1,240 $MTCO_2e$ per year (already taken into account). The City has been and will continue to replace light bulbs within City facilities with LED or similarly efficient lighting, as facilities are upgraded. For residential and commercial customers, SDG&E currently does not offer rebates for the purchase of LED or similarly efficient lighting, but the City will promote rebates as they come available on its website

[15] http://www.eia.gov/tools/faqs/faq.cfm?id=99&t=3

[16] California Public Utilities Commission; http://www.cpuc.ca.gov/NR/rdonlyres/6234FFE8-452F-45BC-A579-A527D07D7456/0/Lighting.pdf

[17] http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=LB

[18] It is estimated that 75 percent of lighting within the City is currently incandescent, halogen, or linear fluorescent. U.S. Department of Energy, 2010 U.S. Lighting Market Characterization, January 2012, Table 4.1; http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/2010-lmc-final-jan-2012.pdf

[19] 75 percent reduction in energy use in half of the 75 percent total incandescent bulbs is (75 percent)*(75 percent)*(50 percent)= 28 percent reduction

and by other means. The City will also provide information on the benefits of the use of LED and efficient lighting from SDG&E and other sources.

Costs and Benefits:

Private: Private costs would be from purchasing LED light bulbs for new construction, and replacing existing light bulbs over time. Benefits would be from reduced energy costs and reduced cost to replace light bulbs (as LED lights last substantially longer).

City: City costs would come from replacing existing inefficient lighting in City facilities with more efficient light bulbs over time, providing information to homeowners and business owners to encourage a switch to LED or other efficient lamps, and evaluating the feasibility of a natural lighting and ventilation ordinance.

4.7 Solar Water Heater/Heat Pump Installation

Measure J: New Construction Residential and Commercial Solar Water Heater Installation	
Goal: 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.	2035 Reduction: 11,604 $MTCO_2e$
Actions: *J-1: Promote the installation of 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)* *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. (~~Mid~~Short-term)*	

Already-Projected Amount: There are no solar water heaters/heat pumps projected to be installed.

Target: The target is to install solar water heaters or heat pumps on all new residential and commercial construction, and retrofit up to 30 percent of existing homes and commercial buildings to include solar water heaters or heat pumps.

GHG Reduction Measure Description: Solar water heaters use water heated by the sun to provide domestic and commercial hot water. Solar water heaters reduce the demand for energy used to heat water. A solar water heater can contribute 30 to 80 percent[20] of the energy needed for

[20] California Energy Commission. 2009. Go Solar California: A Step by Step Tool Kit for Local Governments to Go Solar. Available: http://www.energy.ca.gov/2009publications/CEC-180-2009-005/CEC-180-2009-005.PDF.

residential water heating. Heat pumps are devices that use a small amount of energy to move heat from one location to another.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure J.

Responsibility and Implementation: The three PACE programs described in Measure A also provide financing for the installation of solar water heaters and heat pumps to improve residential energy efficiency. The California Solar Initiative has a low-income solar water heating rebate program and solar thermal program, which offers rebates for solar water heaters. Installation of solar water heaters on all new residential and commercial water heaters could occur through city ordinance. Retrofit of existing homes could occur through a combination of additional encouragement and incentives.

Costs and Benefits:

Private: Private costs would occur through the installation of residential and commercial solar water heaters, which would be passed onto building owners. Benefits would occur through reduced water heating costs.

City: City costs would occur from adopting and enforcing an ordinance requiring new homes and commercial buildings to install solar water heaters or heat pumps.

4.8 Transportation Demand Management

Measure K: Promote Transportation Demand Management Strategies	
Goal: 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.	2035 Reduction: 23,549 $MTCO_2e$
Actions: *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"[21] 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, bikesharing, parking pricing, and bike parking.* (~~Mid~~Short-term) *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*	

[21] Available: http://www.icommutesd.com/documents/tdmstudy_may2012_webversion_000.pdf.

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; carsharing, bikesharing long–term bicycle parking and shuttle programs. (Mid-term)

Already-Projected Amount: There are no projections for this measure. As of 2012[22], alternative (non-single occupancy vehicle use—such as working at home, carpooling, transit, walking and biking) mode use by Carlsbad workers is 22 percent. Of these alternative uses, most workers work at home (44 percent) and carpool (36 percent), followed by public transit (10 percent), other means (including biking, 6 percent), and walking (5 percent).

Target: The Carlsbad General Plan promotes the use of Transportation Demand Management (TDM), but does not specify a target goal. This measure specifies a goal of achieving an additional 10 percent use of alternative modes, for an overall 32 percent alternative mode use by workers employed in Carlsbad. This is projected to be achieved through 40 percent alternative mode use by workers in new nonresidential buildings, and 30 percent alternative mode use by workers in existing (as of 2013) nonresidential buildings.

GHG Reduction Measure Description: Chapter 3 quantifies emissions reductions from the Carlsbad General Plan due to bikeway system improvements, pedestrian improvements, traffic calming, parking facilities and policies, and transportation improvements. This measure is distinct from these reductions because it focuses on TDM, or the application of strategies and policies to reduce travel demand, or redistribute it in time and space. This measure reduces VMT by shifting single occupancy vehicle use to alternative modes, reducing the average commute length, promoting an alternate work schedule, and promoting telecommuting.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure K.

Responsibility and Implementation: The City of Carlsbad will develop a TDM plan describing strategies to reduce travel demand. The city will also develop an ordinance applying to nonresidential developments meeting a specified minimum trip generation threshold, providing connections to public transportation whenever possible. The city will facilitate a coordinated effort between local businesses and NCTD to develop a route expansion and ridership plan wherever feasible. SANDAG's iCommute program assists commuters by providing free carpool and ridematching services, a subsidized vanpool program, the Guaranteed Ride Home program, SchoolPool carpooling programs for parents, and information about teleworking, all of which can support the city's TDM goals.

Costs and Benefits:

[22] American Community Survey. 2012. Selected Economic Characteristics for Carlsbad, California. Available: http://factfinder2.census.gov/.

Private: Private costs could include need for a TDM coordinator for private businesses, providing on-site facilities (showers, lockers), and shuttle programs. Benefits would accrue from reduced spending on gasoline, and reduced traffic from less employee commute.

City: City costs would result from developing, implementing, and enforcing a TDM plan and ordinance. Implementation costs would include conducting an outreach and education campaign to promote the benefits of TDM.

4.9 Increased Zero-Emissions Vehicle (ZEV) Travel

Measure L: Promote an Increase in the Amount of Zero-Emissions Vehicle Travel	
Goal: Promote an increase in the amount of ZEV[23] miles traveled from a projected 15 percent to 25 percent of total vehicle miles traveled by 2035.	2035 Reduction: 54,158 $MTCO_2e$
Actions: *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 the 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*)* *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.* (Short-term) *L-3: Construct ZEV charging stations based on the community-wide charging station siting plan described in L-2~~1~~ 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) *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) *L-5: Adopt requirements for ZEV parking for new developments.* (~~Mid~~Short-term) *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.* (~~Mid~~Short-term) *L-7: Update the city's Fleet Management Program to include a low and zero-emissions vehicle replacement/purchasing policy. Increase the proportion of fleet low and zero–emissions vehicle miles traveled to 25 percent of all city-related VMT by 2035.* (~~Mid~~Short-term)	

Already-Projected Amount: According to the EPIC mitigation calculator, 15 percent of the vehicle miles traveled in 2035 are projected to be from ZEVs.

[23] Zero-Emissions Vehicle (ZEV) is a vehicle that emits no tailpipe pollutants from the onboard source of power. ZEVs include electric vehicles, fuel cell vehicles, and plug-in hybrids, when in electric mode.

Target: The target is to increase the proportion of vehicle miles traveled from 15 percent to 25 percent by the year 2035.

GHG Reduction Measure Description: Driving ZEVs reduces carbon emissions by eliminating direct tailpipe emissions of carbon dioxide and other GHGs. The production of electricity used to power electric vehicles generates GHGs; however, SDG&E electricity generates much less GHGs than the direct combustion of fossil fuels. Furthermore, electric vehicles can be charged at home or the workplace using energy produced by PV panels, eliminating GHG emissions completely, at least for the months when PV panels produce the full amount of electricity needed for operations. The ability to provide entirely emissions-free transportation through the use of PV panels to charge ZEVs should be capitalized on whenever possible.

Quantification of GHG Emissions Reductions: The EPIC mitigation calculator was used to quantify emission reductions for Measure L.

Responsibility and Implementation: The city will promote an increase in the amount of electric vehicle travel by constructing ZEV charging stations using the community-wide station siting plan. Grant funding for the construction of the ZEV charging stations can come from the California Energy Commission's Electric Vehicle Charging Infrastructure grant, or other similar grant programs. The city would be responsible for operating (including electricity provision, for stations not using PV panels) and maintaining charging stations.

The city will also promote the use of ZEVs by offering dedicated ZEV parking and adopting requirements for ZEV parking for new development. The city will create an ordinance requiring the installation of ZEV chargers or pre-wiring in new residential construction and major renovations.[24] Through its Fleet Vehicle Replacement Fund, tThe City of Carlsbad will increase the city fleet mix of ZEVs, hybrids, and other low- or zero-emissions vehicles to increase low and zero–emissions vehicle miles traveled to 25 percent by 2035.

Costs and Benefits:

Private: The private cost would be the purchase of an electric vehicle and the cost of electricity to power the electric vehicle, for community members who elect to purchase an electric vehicle. Costs may also occur from installing EV chargers or pre-wiring into new residential construction or major renovations. Benefits would accrue from reduced spending on gasoline.

City: City costs would be from planning for, constructing, operating (including providing electricity, for stations not using PV panels) and maintaining ZEV charging stations, which may be offset by potential user fees or grants from the California Energy Commission, or other similar agencies. City costs may occur from developing ordinances to require the installation of ZEV chargers in new residential construction and major renovations. City costs may also occur from fleet purchases of ZEV vehicles. Benefits would accrue from reduced spending on gasoline.

[24] Assembly Bill 1092 (2013) requires the Department of Housing and Community Development to propose minimum building standards for the installation of future electric vehicle charging infrastructure for parking spaces in multi-family dwellings and nonresidential development.

4.10 Citywide Renewable Projects

Measure M: Develop More Citywide Renewable Energy Projects	
Goal: Produce the equivalent amount of energy to power 2,000 homes (roughly equivalent to a 5 percent reduction) by 2035 from renewable energy projects.	2035 Reduction: 4,580 $MTCO_2e$
Actions: *M-1: Conduct a feasibility study to evaluate~~prioritize~~ citywide renewable energy projects and prioritize accordingly. (Short-term)* *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) *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)	

Already-Projected Amount: There is no projected amount for this measure.

Target: The target is the production of 12,341 megawatt-hours per year, approximately the energy required to power 2,000 homes.

GHG Reduction Measure Description: The City of Carlsbad has a number of renewable energy projects in various stages of planning and development. The Maerkle Reservoir Hydropower Project, which has been permitted by the Federal Energy Regulatory Commission (FERC), is estimated to produce about 833 MWh per year. In 2014, Alga Norte Community Park was outfitted with a PV system in the parking area, which will generate some 360 MWh of electricity per year. Other planned projects include a second pressure-reducing hydroelectric generator, similar to the Maerkle Reservoir Hydropower Project, and a ~~potential solar PV project in Alga Norte Community Park~~ potential large PV system at the Maerkle Reservoir property.

Quantification of GHG Emissions Reduction: The production of 12,341 megawatt-hours per year was converted into $MTCO_2e$ using the 2010 SDG&E coefficient of 742.2 lb CO_2e per megawatt-hour. This corresponds to a reduction of 4,580 $MTCO_2e$.

Responsibility and Implementation: The City of Carlsbad would be responsible for conducting a feasibility study, determining suitable renewable technologies, siting renewable projects, and constructing and maintaining the renewable energy projects. Funding sources include the Energy Efficiency Financing for Public Sector Projects, which includes renewable energies such as PV systems and other distributed generation technologies, as well as the SGIP, as described above in Measure C. As well, the city will use IRF to install renewable energy systems as part of refurbishment of existing city facilities, where it is feasible to do so.

Costs and Benefits:

Private: There are no direct private costs from this measure.

City: City costs are planning (including a feasibility study), constructing and maintaining the renewable facilities, some of which may be offset through the funding sources described above. Benefits accrue from electricity savings to City through net energy metering.

4.11 Water Utilities System Improvements

Measure N: Reduce GHG Intensity of Water Utilities[25] Supply Conveyance, Treatment, and Distribution	
Goal: Reduce the intensity of GHG emissions from water utilities (including water supply, wastewater, and recycled water) conveyance, treatment, and distribution by 8 percent by 2035.	2035 Reduction: 5,968 $MTCO_2e$
Action: *N-1: Improve water utilities (including water supply, wastewater, and recycled water) conveyance, treatment and distribution, and other system improvements.* (Mid to Long-term)	

Already-Projected Amount: The goal of an 8 percent reduction by 2035 is the default value in the EPIC mitigation calculator.

Target: The target is to achieve the already-projected amount.

GHG Reduction Measure Description: This measure estimates emissions reductions from changes in the efficiency of water utilities (including water supply, wastewater, and recycled water) conveyance, treatment, and distribution facilities within the City of Carlsbad.[26] This combines improvements in overall system efficiency, the reduction in GHG intensity of electricity used to move water, wastewater, and recycled water, and replacing potable water needs with expanded recycled water supply. Carlsbad's Sewer Master Plan, for example, calls for eliminating several sewer lift stations and replacing them with gravity pipelines, which would reduce energy usage.[27] The Encina Water Pollution Control Facility exemplifies GHG reductions from water treatment; the facility currently is able to satisfy 60 percent of its energy needs through methane capture and cogeneration and has a long-term goal of energy independence from purchased energy. The 2012 Carlsbad Municipal Water District Recycled Water Master Plan estimates that, by 2030, recycled water demand could double from 4,100 acre-feet/year to about 9,100 acre-

[25] For purposes of this measure, water utilities include potable water treatment and conveyance, sewer conveyance, and recycled water treatment and conveyance systems.

[26] Note: The GHG reductions from water conservation measures detailed in the 2010 Carlsbad Municipal Water District Urban Water Management Plan (UWMP) have already been considered in the GHG forecasts. Further GHG reductions may be possible through greater conservation efforts than those outlined in the UWMP, including Ordinance No. 44 (2009); however, these have not been quantified in this CAP.

[27] The City is replacing three sewer lift stations, which use a combined total of approximately 6,200 kWh of electricity per year with gravity pipelines, in addition to other planned rehabilitation upgrades included in the Sewer Master Plan.

feet/year. Expanding the recycled water system would appreciably reduce the need for more expensive imported water needs in the future.

Quantification of GHG Emissions Reduction: The EPIC mitigation calculator was used to quantify emission reductions for Measure N, which estimates wastewater emissions reductions from methane capture, reductions from water treatment and distribution facilities, and changes in the supply network, including greater use of recycled water.

Responsibility and Implementation: The City of Carlsbad would be responsible for making the improvements to water supply conveyance, treatment, and distribution, which could occur through improvements to the Carlsbad Municipal Water District's system.

Costs and Benefits:

Private: There would be no private costs for this measure.

City: Costs to the City of Carlsbad are from implementing the improvements to the water utilities system. Benefits occur by reducing energy costs and having newer water delivery infrastructure.

Measure O: Encourage the Installation of Greywater and Rainwater Collection Systems	
Goal: Encourage the installation of greywater and rainwater collection systems with a goal of 15 percent of homes by 2035.	2035 Reduction: 1,205 $MTCO_2e$
Actions: *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) *O-2: Create a design reference manual, or provide links to an existing one, for the design of greywater and rainwater collection systems.* (Mid-term) *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)	

Already-Projected Amount: There is no projection for this measure.

Target: The target is for fifteen percent of single-family homes to have greywater and rainwater collection systems installed by 2035.

GHG Reduction Measure Description: Greywater is wastewater generated from hand washing, laundry machines, and showers and baths that have not been contaminated by any toilet discharge. Greywater can be recycled onsite for toilet flushing and subsurface (below ground) landscape irrigation using a greywater system. The regulations for the design, construction and use of greywater systems are in Chapter 16A of the California Plumbing Code. Some small

greywater systems that involve laundry machines or single fixtures only are exempt from permits. More complicated greywater systems require building permits from the City. Rainwater harvesting is the practice of collecting rainwater from hard surfaces, such as roofs, and storing it in barrels or cisterns, which can be used for landscape irrigation. Measure O is to promote the use of on-site greywater and rainwater collection systems for residences.

Quantification of GHG Emissions Reductions: Nationwide, about seven percent of U.S. GHG emissions are from water and wastewater service provision to urban populations.[28] For this measure, it was assumed that seven percent of the citywide emissions are from water provision and wastewater services.[29] Therefore, about 32,000 $MTCO_2e$ of 2035 emissions are from water provision and wastewater services.

If maximally pursued, the use of greywater and rainwater collection systems could reduce water demands by 25 percent on a statewide scale.[30] For this measure, it was assumed the 25 percent reduction in water demand would scale to individual houses that implement greywater and rainwater collection systems. A goal of 15 percent of homes with greywater and rainwater harvesting systems was chosen. A 25 percent reduction of water use in 15 percent of homes corresponds to a GHG reduction of about 1,205 $MTCO_2e$.

Responsibility and Implementation: Homeowners would be responsible for the installation of greywater and rainwater collection systems. The City of Carlsbad will, through the Carlsbad Municipal Water District, host greywater and rainwater harvesting workshops, or partner with existing workshop providers. The City will also reference or develop a greywater and rainwater collection system design manual and consider offering a rebate for residential greywater systems that require a permit to cover the cost of obtaining a permit.

Costs and Benefits:

Private: Costs to homeowners would be from constructing and maintaining greywater and rainwater collection systems. Benefits would accrue over time through water savings.

City: Costs to the City of Carlsbad are from hosting workshops and developing or reviewing greywater and rainwater collection manuals to adopt.

4.12 Combined Effect of CAP GHG Reduction Measures and Forecast with CAP

Table 4-1 shows a summary of the CAP GHG reduction measures. While the individual measures may be implemented over different timescales, for the purposes of calculating their impact in this section, it was assumed that the effect of all measures would begin in the mid-term time frame and increase linearly to reach the full reduction potential in the year 2035. Table 4-2 shows

[28] Source: V. Novotny. 2010. "Urban Water and Energy Use: From Current US Use to Cities of the Future." *Cities of the Future/Urban River Restoration*. Water Environment Federation. 9: 118-140.

[29] The 7 percent estimate was used for the purpose of this reduction measure because the Chapter 2 inventory did not directly quantify all emissions associated with water use, but rather included those as part of commercial, industrial and residential energy use (e.g. heating water).

[30] Source: J. Loux, R. Winer-Skonovd, E. Gellerman. 2012. "Evaluation of Combined Rainwater and Greywater Systems for Multiple Development Types in Mediterranean Climates." *Journal of Water Sustainability*. 2(1): 55-77.

proposed residential energy conservation, commercial energy conservation, and transportation demand management ordinances adjacent to the applicable reduction measures.

As a whole, the CAP GHG reduction measures were designed to enable Carlsbad to achieve its GHG reduction target in the year 2035. The combined GHG reductions from these measures is 185,919 $MTCO_2e$ in 2035, which cover the emissions "gap" identified in Chapter 3. Table 4-3 adds the effect of the CAP GHG reduction measures to the community forecast, and compares the resulting forecast with CAP GHG reduction measures to emission targets. As proposed, this CAP meets the emissions targets for both 2020 and 2035. Interim "milestone" years 2025 and 2030 are presented in Table 4-3 in order for the city to check its progress towards meeting the 2035 target. Figure 4-1 shows the forecast with CAP reduction measures compared to the emissions targets to demonstrate that both 2020 and 2035 targets will be met with the implementation of this CAP.

For this CAP to successfully be implemented, the City of Carlsbad must play a prominent role in implementing the CAP GHG reduction measures. In addition to responsibility and implementation covered for each measure in this chapter, the following chapter discusses how the CAP will be revised and updated in the future to ensure that the targets are met.

Table 4-1: CAP GHG Reduction Measures Summary

Measure Letter	*GHG Reduction Measures*	*GHG Reduction in 2035 ($MTCO_2e$)*
A	Install residential PV systems	10,136
B	Install commercial and industrial PV systems	13,336
C	Promote building cogeneration for large commercial and industrial facilities	1,067
D	Encourage single-family residential efficiency retrofits	1,132
E	Encourage multi-family residential efficiency retrofits	351
F	Encourage commercial and city facility efficiency retrofits	18,377
G	Promote commercial and city facility commissioning, or improving building operations	18,377
H	Implementation of Green Building Code	179
I	Replace Incandescent bulbs with LED bulbs	21,900
J	New construction residential and commercial solar water heater/heat pump installation & retrofit of existing residential	11,604
K	Promote Transportation Demand Management	23,549
L	Increase zero-emissions vehicle travel	54,158
M	Develop more citywide renewable energy projects	4,580
N	Reduce the GHG intensity of water supply conveyance, treatment and delivery	5,968
O	Encourage the installation of greywater and rainwater systems	1,205
Total GHG Reductions		**185,919**

Table 4-2: List Of Proposed Ordinances And Applicable Measures

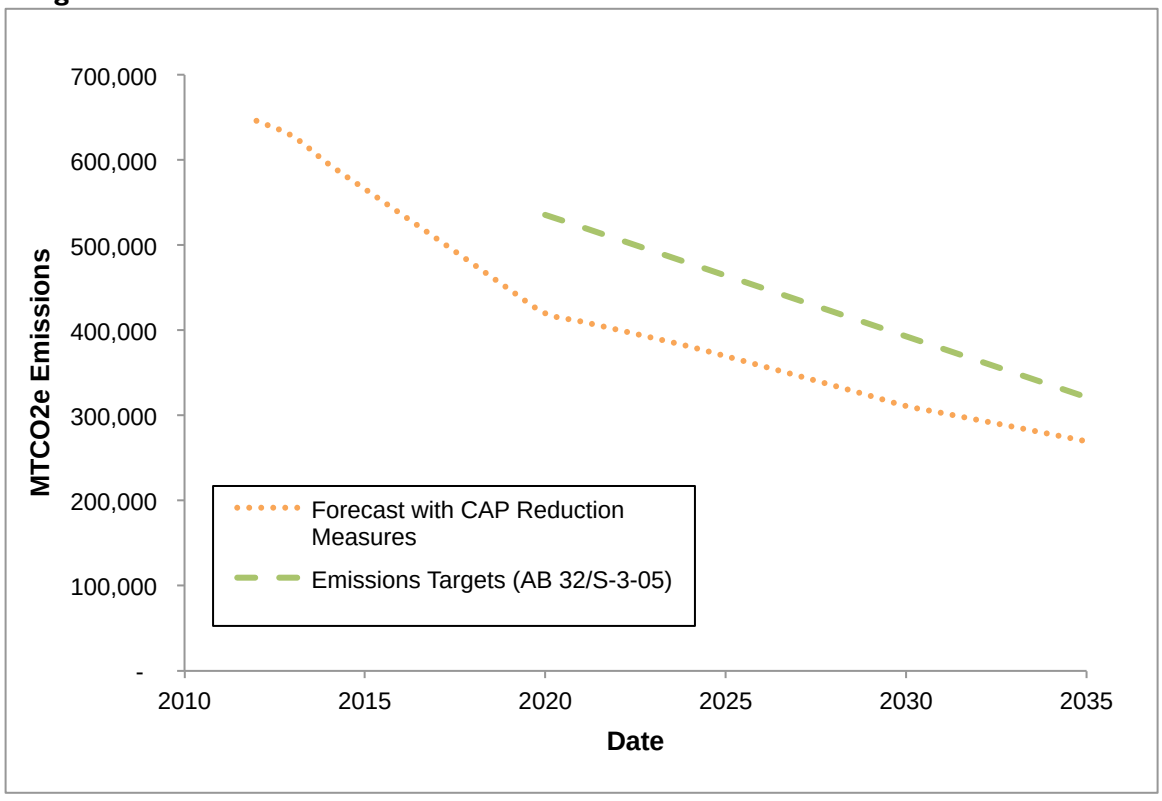
Proposed Ordinances	*Applicable Measures*
Residential Energy Conservation Ordinance	A[+], D, E, H, I, J, L
Commercial Energy Conservation Ordinance	B, F, H, I, J, L
Transportation Demand Management Ordinance	K

[+] ~~*If solar panel requirement found feasible*~~

Table 4-3: Forecast Community Emissions with CAP GHG Reduction Measures and Targets

Year	*Modified Baseline Forecast (From Chapter 3) ($MTCO_2e$)*	*CAP GHG Reduction Measures (Phased in Linearly to 2035) ($MTCO_2e$)*	*Forecast Community Emissions with CAP GHG Reduction Measures*	*GHG Emission Targets (Linear Scaling of AB 32/S-3-05) ($MTCO_2e$)*	*Emission Target Met?*
2020	473,082	53,120	419,962	535,763	Yes
2025	467,018	97,386	369,632	464,328	
2030	452,762	141,654	311,108	392,893	
2035	455,556	185,919	~~269,639~~269,637	321,458	Yes

Figure 4-1: Forecast Community Emissions with CAP Reduction Measures and Targets



Chapter 5: Project Review Checklist and Monitoring Progress

Pages 5-1 through 5-6

Modify Chapter 5 as follows:

~~PROJECT REVIEW CHECKLIST~~IMPLEMENTATION, ~~AND~~ MONITORING AND REPORTING ~~PROGRESS~~

Chapters 3 and 4 identify a comprehensive set of goals and specific, enforceable measures and actions that the city will take in order to meet its GHG emissions targets. Implementation and monitoring are key to ensuring that the city is successful in reaching those targets. The city will use an adaptive management approach to CAP implementation. Adjustments to management actions will be made as needed to support continuous improvement based on measured results, monitoring effectiveness, new technology, or in response to deficiencies in program assessment results. This chapter describes how the City of Carlsbad will implement the CAP and monitor and report on its effectiveness~~review development projects to achieve the reduction measures in Chapter 4~~, consistent with State CEQA Guidelines Sections 15183.5(b)(1)(D) and (E).

For discretionary projects seeking to use CEQA streamlining provisions, in an environmental document the city may refer to the required measures in this CAP as mandatory conditions of approval or as mitigation. This will enable projects to benefit from CEQA streamlining provisions, while ensuring that the city can achieve the reduction targets outlined in this plan.

5.1 Implementation

Table 5-1 lists all of the measures and actions identified in Chapters 3 and 4 along with the following information:

Responsible Department: The city department(s) that will be primarily responsible for implementing, monitoring, and reporting on the progress for each measure.

Annual GHG Reduction Goal: The estimated annual emission reductions anticipated by target years 2020 and 2035, and interim milestone years 2025 and 2030.

Performance Target: The expected quantified outcome of the GHG reduction measure.

Progress Indicators: The types of data that will be collected to measure progress toward the performance target and correlate to GHG emissions reductions. Progress indicators will be confirmed as part of the implementation for each measure. If a recommended progress indicator is found to be infeasible to collect or track, an alternative indicator will be identified.

Unit of Measure: Input units used to calculate GHG emissions reductions ($MTCO_2e$), whereby:

Gallons of water = water consumption
kWh/MWh = electricity consumption in kilowatt-hours or megawatt-hours
MTCO2e = metric tons of CO2 equivalent emissions

Therm = natural gas consumption in therms
VMT = vehicle miles traveled

Implementation Timeframe: The schedule by which each action is to be implemented, beginning from the year the CAP is adopted, as follows:

Short-term – one to two years
Mid-term – two to five years
Short to Long-term, or Mid-to Long-term – actions that will begin in the short or mid-term, but take longer than five years to fully implement.

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
General Plan Measures (see Section 3.6 for complete descriptions)					
Bikeway system improvements	Public Works, Community & Economic Development	**2020: 164** 2025: 159 2030: 153 **2035: 147**	Achieve 2.85 miles of bike lanes per square mile, corresponding to .07% VMT reduction o Miles of bikeways added o Miles of bikeways enhanced	VMT	Short to Long-term
Pedestrian improvements and increased connectivity	Public Works, Parks & Recreation, Community & Economic Development	**2020: 2,341** 2025: 2,268 2030: 2,194 **2035: 2,106**	1% VMT reduction o Miles of pedestrian and trail improvements o Number of new connection points	VMT	Short to Long-term
Traffic calming	Public Works, Community & Economic Development	**2020: 585** 2025: 567 2030: 548 **2035: 526**	.25% VMT reduction o Number of traffic calming devices installed o Vehicle travelway width reduction o Pedestrian crossing width reduction	VMT	Short to Long-term
Parking facilities and policies	Public Works, Community & Economic Development	**2020: 4,682** 2025: 4,535 2030: 4,388 **2035: 4,211**	2% VMT reduction o % reduction in parking standards o Number of projects with alternative parking provisions (shared parking, unbundled parking cost, valet, etc.) o Number of EV parking spaces installed	VMT	Short to Long-term

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
Transportation improvements	Public Works, Community & Economic Development	**2020: 1,475** 2025: 1,429 2030: 1,383 **2035: 1,327**	.63 VMT reduction o *Transit ridership counts*	VMT $MTCO_2e$	Short to Long-term
CAP Measures (see Sections 4.1 - 4.11 for complete descriptions)					
A – Promote installation of residential photovoltaic systems		**2020: 2,896** 2025: 5,309 2030: 7,723 **2035: 10,136**	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 suspend PV system permit fees	Community & Economic Development, Communications		o *Number of promotional events* o *MW installed PV*	kWh	Short-term
A-2: Review local regulations for constraints on PV	Community & Economic Development		n/a		Short to Long-term
A-3: Adopt ordinance requiring PV in new residential construction	Community & Economic Development		o *Ordinance adoption* o *MW installed PV*	kWh	Short-term
B - Promote Installation of commercial and industrial photovoltaic systems		**2020: 3,810** 2025: 6,986 2030: 10,161	Promote installation of commercial and industrial PV systems to produce an additional 10.7 MW per year above		

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
		2035: 13,336	projected amounts, or roughly 15 percent of projected commercial and industrial electricity use, by 2035		
B-1: Require PV on large new nonresidential construction	Community & Economic Development		o *Ordinance adopted* o *MW installed PV*	kWh	Short-term
B-2: Adopt an ordinance requiring existing nonresidential developments to install PV panels to offset a portion of their energy use	Community & Economic Development		o *Ordinance adopted* o *MW installed PV*	kWh	Mid-term
C - Promote building cogeneration for large commercial and industrial facilities		**2020: 305** 2025: 559 2030: 813 **2035: 1,067**	Promote building cogeneration for large commercial and industrial facilities, with the goal of producing 6.9 MW		
C-1: Promote cogeneration	Public Works, Communications		o *Promotional activities conducted* o *Number and/or sq. footage of SGIP-funded projects*	kWh/therms	Short-term
C-2: Install cogeneration systems for large city facilities where beneficial	Public Works		o *MW installed co-generation systems*	kWh/therms	Mid to Long-term
C-3: Require cogeneration systems for large commercial and industrial facilities that have on-site electricity production	Community & Economic Development		o *MW installed co-generation systems*	kWh/therms	Mid-term

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
D - Encourage single-family residential efficiency retrofits		**2020: 323** 2025: 593 2030: 862 **2035: 1,132**	Encourage single-family residential efficiency retrofits with the goal of a 50 percent energy reduction compared to baseline in 30 percent of the total single-family homes citywide by 2035 (approximately 10,000 single-family homes out of a total of 35,000)		
D-1: Promote residential energy efficiency incentive and rebate programs	Public Works, Communications		o *Promotional activities conducted*	kWh/therms	Short-term
D-2: Create a citywide "Energy Challenge"	Public Works, Communications		o *Program launch* o *Promotional activities conducted* o *Number of program participants and/or sq. footage of buildings in program*	kWh/therms	Short-term
D-3: Require residential energy audits/retrofits	Community & Economic Development		o *Ordinance adopted* o *Number and/or sq. footage of existing homes retrofitted*	kWh/therms	Short-term
E - Encourage multi-family residential efficiency retrofits		**2020: 100** 2025: 184 2030: 267 **2035: 351**	Encourage multi-family residential efficiency retrofits with the goal of a 50 percent energy reduction in 30 percent of the projected amount of multi-family homes citywide by 2035 (approximately 5,000 out of a total of 17,000)		
(See Measure D above)	Public Works, Communications, Community &		o *See Actions D-1 through D-3 above*	kWh/therms	Short to Mid-term

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
	Economic Development				
F - Encourage commercial and city facility efficiency retrofits		**2020: 5,251** 2025: 9,626 2030: 14,002 **2035: 18,377**	Encourage commercial and city facility efficiency retrofits with the goal of a 40 percent energy reduction in 30 percent of commercial square footage citywide and in city facilities by 2035		
F-1: Install energy efficiency retrofits for city-owned buildings	Public Works		o *Sq. footage of buildings retrofitted* o *% energy use reduction*	kWh/therms	Short-term
F-2: Promote nonresidential energy efficiency incentive and rebate programs	Public Works, Community & Economic Development, Communications		o *Promotional activities conducted* o *Number of program participants and/or sq. footage of buildings retrofitted* o *% energy use reduction*	kWh/therms	Short-term
F-3: Require nonresidential energy audits/retrofits	Community & Economic Development		o *Ordinance adopted* o *Number and/or sq. footage of existing buildings retrofitted* o *% energy use reduction*	kWh/therms	Short-term
G - Promote commercial and city facility commissioning		**2020: 5,251** 2025: 9,626 2030: 14,002 **2035: 18,377**	Encourage commercial and city facility commissioning, or improving existing and new building operations, with the goal of a 40 percent energy reduction in 30 percent of commercial square footage citywide and in city-owned buildings by		

Table 5-1: CAP Implementation Matrix

	Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
				2035		
	G-1: Promote commercial commissioning	Public Works, Community & Economic Development, Communications		o *Promotional activities conducted* o *Number and/or sq. footage of commissioned buildings* o *% energy use reduction*	kWh/therms	Short-term
	G-2: Commission city facilities	Public Works		o *Number and/or sq. footage of commissioned buildings* o *% energy use reduction*	kWh/therms	Mid-term
H - Implement green building measures			**2020: 51** 2025: 94 2030: 136 **2035: 179**	Implementation of a 5 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: Increase Green Building Code requirements by five percent.	Community & Economic Development		o *Ordinance adopted* o *Number and/or sq. footage of buildings with enhanced GBC features*	kWh/therms $MTCO_2e$	Short-term
I - Promote replacement of incandescent and halogen bulbs with LED or other energy efficient lamps			**2020: 6,257** 2025: 11,471 2030: 16,686 **2035: 21,900**	Replace 50 percent of incandescent and halogen light bulbs citywide with LED or similarly efficient lighting by 2035		
	I-1: Replace incandescent and	Public Works		o *Building sq footage upgraded*	kWh	Short-term

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
halogen light bulbs in city facilities			o *Number of fixtures replaced*		
I-2: Promote the use of LED rebate programs	Public Works, Communications		o *Promotional activities conducted*	kWh	Short-term
I-3: Develop natural lighting and ventilation standards; install city facility demonstration project	Community & Economic Development Public Works		o *Feasibility study conducted* o *Number of buildings with natural lighting and ventilation features* o *% energy use reduction*	kWh/therms	Mid-term
J - New construction residential and commercial solar water heater/heat pump installation & retrofit of existing residential		**2020: 3,315** 2025: 6,078 2030: 8,841 **2035: 11,604**	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 residential solar water heaters and heat pump retrofit incentive, rebate and financing programs	Public Works, Communications		o *Promotional activities conducted* o *Solar heater/heat pump installations*	kWh/therms	Short-term
J-2: Solar water heater and heat pump ordinance for new nonresidential construction	Community & Economic Development		o *Ordinance adopted* o *Solar heater/heat pump installations* o *MW installed PV*	kWh/therms	Short-term
K - Promote transportation demand management strategies		**2020: 6,728** 2025: 12,335 2030: 17,942 **2035: 23,549**	Promote Transportation Demand Management Strategies with a goal of achieving a 10 percent increase in alternative mode use by workers in		

Table 5-1: CAP Implementation Matrix

	Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
				Carlsbad, for a total of 32 percent alternative mode use		
	K-1: Adopt citywide transportation demand management (TDM) plan	Community & Economic Development, Public Works		o *TDM plan adopted* o *TDM participation rates* o *% VMT reduced*	VMT	Short-term
	K-2: Adopt TDM ordinance	Community & Economic Development, Public Works		o *TDM ordinance adopted* o *TDM participation rates* o *% VMT reduced*	VMT	Mid-term
	L - Promote an increase in the amount of zero-emissions vehicle travel		**2020: 15,474** 2025: 28,368 2030: 41,263 **2035: 54,158**	Promote an increase in the amount of ZEV miles traveled from a projected 15 percent to 25 percent of total vehicle miles traveled by 2035		
	L-1: Construct a "PV to EV" pilot project	Public Works, Community & Economic Development		o *kW installed PV* o *Number of ZEV charging units*	*VMT* *kWh*	Short-term
	L-2: Prepare a community-wide charging station siting plan	Public Works, Community & Economic Development		o *Siting Plan prepared*		Short-term
	L-3: Construct ZEV charging	Public Works		o *Number of charging stations installed*	VMT	Mid-term

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
stations based on the community-wide charging station siting plan			o *kWh charging sessions*		
L-4: Offer dedicated ZEV parking and charging stations	Public Works, Community & Economic Development		o *Number of installed ZEV parking spaces/charging stations* o *kWh charging sessions*	VMT	Mid-term
L-5: Adopt requirements for ZEV parking for new developments.	Community & Economic Development		o *Number of installed ZEV parking spaces/charging stations* o *kWh charging sessions*	VMT	Short-term
L-6: Require EV chargers or pre-wiring in new residential construction and major renovations.	Community & Economic Development		o *Ordinance adopted* o *Number of EV chargers installed*	VMT	Short-term
L-7: Increase the proportion of city fleet low and zero–emissions vehicle miles traveled to 25 percent of all city-related VMT	Public Works		o *% LEV and ZEV fleet VMT*	VMT	Short-term
M - Develop more citywide renewable energy projects		**2020: 1,309** 2025: 2,399 2030: 3,490 **2035: 4,580**	Produce the equivalent amount of energy to power 2,000 homes (roughly equivalent to a 5 percent reduction) by 2035 from renewable energy projects		
M-1: Conduct a feasibility study to evaluate citywide renewable energy projects and prioritize accordingly.	Public Works		o *Feasibility study conducted*		Short-term

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
M-2: Incorporate renewable energy measures such as PV system installation on city buildings and parking lots, or microturbine installation on city facilities	Public Works		o *MW installed renewable energy systems*	MWh	Mid to Long-term
M-3: Pursue available funding sources for the construction of municipal renewable energy projects	Public Works		o *Number of EEFP or SGIP-funded projects*	MWh	Mid to Long-term
N - Reduce the GHG intensity of water supply conveyance, treatment and distribution		**2020: 1,705** 2025: 3,126 2030: 4,547 **2035: 5,968**	Reduce the intensity of GHG emissions from water utilities (including water supply, wastewater, and recycled water) conveyance, treatment, and distribution by 8 percent by 2035		
N-1: Improve water utilities (including water supply, wastewater, and recycled water) conveyance, treatment and distribution, and other system improvements.	Public Works, Carlsbad Municipal Water District		o *Number of water system improvement projects* o *% energy use reduction*	kWh	Mid to Long-term
O - Encourage the installation of greywater and rainwater systems		**2020: 344** 2025: 631 2030: 918 **2035: 1,205**	Encourage the installation of greywater and rainwater collection systems with a goal of 15 percent of homes by 2035		
O-1: Conduct greywater and rainwater collection systems workshops	Carlsbad Municipal Water District,		o *Number of workshops conducted* o *% water use reduction*	Gallons of water	Mid-term

Table 5-1: CAP Implementation Matrix

Measure / Actions	***Responsible Department(s)***	***Annual GHG Reduction Goals ($MTCO_2e$)***	***Performance Target*** / **Progress Indicators**	***Unit of Measure***	***Implementation Timeframe***
	Communications				
O-2: Create a greywater design reference manual	Community & Economic Development, Carlsbad Municipal Water District		o *Reference manual created* o *% water use reduction*	Gallons of water	Mid-term
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.	Carlsbad Municipal Water District		o *Feasibility study conducted* o *Number of permit rebates issued* o *% water use reduction*	Gallons of water	Mid-term

For discretionary projects seeking to use CEQA streamlining provisions, in an environmental document the city may refer to the required measures in this CAP as mandatory conditions of approval or as mitigation. This will enable projects to benefit from CEQA streamlining provisions, while ensuring that the city can achieve the reduction targets outlined in this plan.

5.1 Project Review Thresholds and Checklist

COMPLIANCE WITH CAP

During the course of project review, city will evaluate whether a project is subject to provisions of this CAP, using the screening criteria below. Once this is established, a project can comply with the CAP in one of two ways:

- **Checklist Approach.** The Project Review Checklist below provides direction about measures to be incorporated in individual projects, which will be used during the normal development review process. Project features that help a project meet the provisions of the CAP would then become part of project conditions of approval.
- **Self-Developed Program Approach.** Rather than use the standard checklist, project proponents can develop their own program that would result in the same outcome as the checklist; approval would be subject to city review.

CEQA STREAMLINING

Project Review Checklist

The Project Review Checklist is applicable for all land use development projects subject to CEQA review. The County of San Diego's 2013 Guidelines for Determining Significance for Climate Change were used to establish a "bright line" threshold of 2,500 $MTCO_2e$ per year.[51] Table 5-1 lists the project review thresholds for a range of project types and sizes to identify the "bright line" threshold; projects equal to or exceeding these thresholds would be subject to CAP measures.[52]

Table 5-1: Project Review thresholds

Project/Plan Type	*Screening Threshold*
Single-Family Housing	85 dwelling units
Multi-family Housing	130 dwelling units
Assisted Living Facility	240 dwelling units
University/College (four years)	336 students

[51] The City of San Diego's 2013 Draft Significance Thresholds for Greenhouse Gas Emissions contain the same bright line threshold of 2,500 $MTCO_2e$. The methodology used to develop the threshold is referred to as the "gap-based approach," and is described in detail in both the City's draft and County's adopted significance thresholds.

[52] If a proposed project is below the screening criteria, GHG emissions would still be reduced through compliance with applicable City of Carlsbad ordinances and regulations.

~~Library~~	~~81,000 square feet~~
~~Restaurant~~	~~12,000 square feet~~
~~Hotel~~	~~100 rooms~~
~~Retail Store/Shopping Center~~	~~30,000 square feet~~
~~Convenience Market (24 hour)~~	~~2,000 square feet~~
~~Office~~	~~60,000 square feet~~
~~Hospital/Medical Office~~	~~45,000 square feet~~
~~Warehouse~~	~~140,000 square feet~~
~~Industrial~~	~~75,000 square feet~~
~~*Source: Adapted from Table 3, 2013 County of San Diego Guidelines for Determining Significance for Climate Change.*~~ ~~*Note: Proposed project land use types will be compared with the land use types included in the screening table above to determine applicability. A shopping center includes a group of commercial establishments that is developed as a unit. Industrial facilities would typically involve assembly of processed or partially processed materials into products and would have an energy demand that is not substantially higher than office buildings of the same size and scale. Industrial facilities would not typically generate dust, other air pollutants, light, or noise that it perceptible beyond the boundary of the subject property.*~~	

~~For proposed projects above the screening thresholds, project proponents should complete the CAP Project Review Checklist (Table 5-2). For each item on the checklist, project proponents should indicate whether or not the measure is included as part of the project, or if it is not applicable. The checklist is designed to meet the targets set for the measures presented in Chapter 4. The checklist is preliminary and illustrative of the items of that will be included in the finalized checklist. The city will provide a final checklist incorporating requirements in ordinances drafted for the CAP.~~

~~**Table 5-2: Preliminary CAP PRoject REVIEW CHECKLIST**~~		
~~**RENEWABLE ENERGY PRODUCTION**~~		
~~1. For new nonresidential projects with more than 50 cars surface parked or on roofs of parking structures, would the project include PV panels over at least half of the surface/roof parked cars or other equivalent renewable energy production?~~	~~☐ Included~~	~~☐ Not Applicable~~
~~Explanation:~~ ~~*Describe the measures taken to meet this requirement, if applicable.*~~		
~~**COGENERATION**~~		

~~**Table 5-2: Preliminary CAP PRoject REVIEW CHECKLIST**~~		
~~2. For the construction or retrofit of a large commercial or industrial facility with an on-site electricity production, would the proposed project include a building cogeneration system?~~	~~☐ Included~~	~~☐ Not Applicable~~
~~Explanation:~~		
~~**ENERGY CONSERVATION ORDINANCES**~~		
~~3. For residential and commercial construction or renovations in excess of $50,000, would the proposed project meet the requirements in the applicable energy conservation ordinance?~~	~~☐ Included~~	~~☐ Not Applicable~~
~~Explanation:~~		
~~**GREEN BUILDING CODE**~~		
~~4. Would the proposed project meet the energy efficiency standard of 5 percent above Title 24 standards (CALGreen)?~~	~~☐ Included~~	~~☐ Not Applicable~~
~~Explanation:~~		
~~**SOLAR WATER HEATERS/HEAT PUMPS**~~		
~~5. For residential and commercial projects, does the project include solar water heaters to reduce the energy needed for residential water heating by 50 percent, or heat pumps to reduce the heating/cooling load by 50 percent?~~	~~☐ Included~~	~~☐ Not Applicable~~
~~Explanation:~~		
~~**TRANSPORTATION DEMAND MANAGEMENT**~~		

~~**Table 5-2: Preliminary CAP PRoject REVIEW CHECKLIST**~~		
~~6. For proposed projects that meet the minimum trip generation thresholds set in the City of Carlsbad Transportation Demand Management (TDM) ordinance, does the project include a TDM plan, containing a description of how minimum alternative mode use will be achieved and maintained over the life of the project?~~	☐ ~~Included~~	☐ ~~Not Applicable~~
~~Explanation:~~ ~~*Include TDM plan if applicable.*~~		
~~**ZERO EMISSIONS VEHICLES**~~		
~~7. For proposed projects subject to the City of Carlsbad off-street parking requirements, does the proposed project provide preferential parking for electric vehicles and/or charging stations for electric vehicle use?~~	☐ ~~Included~~	☐ ~~Not Applicable~~
~~Explanation:~~		
~~**OTHER GHG REDUCTION MEASURES AND/OR FEATURES**~~		
~~8. Describe other GHG reductions measures and/or features of the proposed project:~~	☐ ~~Included~~	☐ ~~Not Included~~
~~Explanation:~~		

~~A completed CAP Project Review Checklist, including supporting documentation for applicable measures, demonstrates a proposed project complies with the CAP.~~

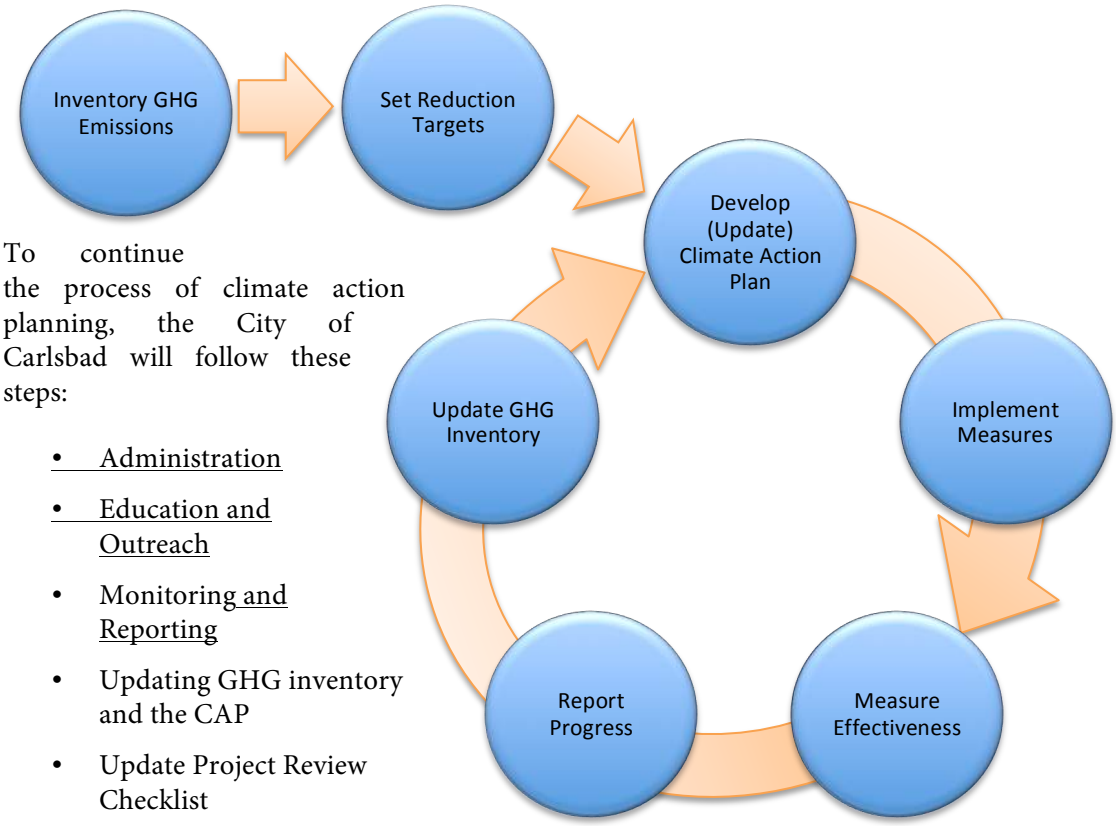
5.2 Monitoring ~~Progress~~and Reporting

This CAP serves as a toolkit for the City of Carlsbad to reduce community-wide GHG emissions and meet emissions targets. Climate action planning, however, is an iterative and adaptive management process~~;~~ it requires administration, public outreach~~and requires~~, monitoring progress and measuring results, ~~and~~ periodically revisiting assumptions and adjusting provisions when necessary. Through regular monitoring and measuring the performance of CAP activities, the city will learn what is working and what is not. This will enable the city to make timely adjustments to existing measures, replace ineffective actions, and/or add new measures as changes in technology, federal and state programs, or other circumstances warrant.

Figure 5-1 shows the steps in the process of climate action planning.

[Replace Figure 5-1 as follows:]

Figure 5-1: Process of Climate Action Planning



To continue the process of climate action planning, the City of Carlsbad will follow these steps:

- Administration
- Education and Outreach
- Monitoring and Reporting
- Updating GHG inventory and the CAP
- Update Project Review Checklist

ADMINISTRATION

Following adoption of this CAP, the city will designate a CAP administrator and form an interdisciplinary CAP implementation team from within the city organization. The administrator, in conjunction with the implementation team, will be responsible for initial program start-up activities and for overseeing implementation, monitoring and reporting of all actions described in the CAP. The composition of the implementation team may vary from time to time as needed, but it is expected that core members will include staff from Public Works, Community and Economic Development, Finance, and Communications departments. As some of the monitoring and reporting activities will require coordination with other agencies, the implementation team will need to foster effective partnerships accordingly.

Operating resources for administering the CAP will be provided through the city's annual budget process. To maximize efficiency and maintain costs, the city will integrate CAP implementation activities into existing workloads and programs whenever possible. Potential private and public funding resources for individual GHG reduction measures are identified in the measure descriptions in Chapter 4. However, since program incentives and funding sources

change over time, the CAP Administrator and Implementation Team will need to keep current on available resources as GHG reduction measures are implemented.

EDUCATION AND OUTREACH

A program of this scope and consequence will require substantial community support in order to succeed. Key to garnering this support is to raise the level of community awareness through education and outreach. Most of the individual GHG reduction measures in Chapter 4 include a promotion and education component. Appendix A provides a listing of internet resources on a variety of climate change-related topics. In addition to these features built into the CAP, the city will utilize its website, social media, and other communications channels to provide information about climate change science and anticipated impacts, and by providing residents and businesses with information and resources to help them take action. The city's website already has a good deal of information related to energy and water efficiency programs, and other environmental sustainability efforts. This Climate Action Plan is also available on the city's website. The city will build upon this base of resources by providing current information and links to various local, state and federal incentive programs to reduce one's carbon footprint, and provide assistance to homeowners, businesses, and contractors seeking to make energy efficiency improvements.

MONITORING AND REPORTING

The City of Carlsbad will ~~periodically~~ annually monitor and report on CAP implementation activities. The annual monitoring report will include implementation status of each action and progress towards achieving the performance targets of the corresponding emissions reduction measure~~targets~~. The annual monitoring report will also include information on the status of the federal and state level emissions reductions measures identified in Chapter 3 of this CAP, as well as any new efforts that may emerge in the reporting year. The annual report will be presented to the City Council at a public meeting during which interested parties may comment on the report.

UPDATING GHG INVENTORY AND THE CAP

The city will update the community and government operations inventories for calendar year 2014 for inclusion in the first annual report, and then will update the inventories every three years thereafter. ~~This periodic assessment will contain data on residential, industrial, and commercial energy use~~For continuity, the inventory updates will tally emissions from the same sectors analyzed in Chapter 2 of this CAP. If an updated inventory reveals that the plan is not making adequate progress toward meeting the GHG target, or that new technologies and programs emerge that warrant inclusion in the CAP, the city will adjust the CAP by modifying, adding, and/or replacing measures as necessary. New opportunities for GHG reductions, including new funding sources and the ability to link city reduction actions to the city's Capital Improvement Plan, Infrastructure Replacement and Fleet Vehicle Replacement schedules, and other programs can also be incorporated into future updates of the CAP. -Interim "milestone" targets for years 2025 and 2030 as shown in Table 4-3 will be used to gauge whether the city is making adequate progress toward meeting the 2035 target. Recommendations to adjust the CAP may be presented to the City Council as part of the annual report or at any other time throughout the year as necessary to ensure effective CAP implementation.

~~**UPDATING GHG INVENTORY AND THE CAP**~~

~~As part of the periodic monitoring assessments, the city will assess whether information on GHG inventory or targets is substantially out of date. If so, the city will take necessary actions to update the inventory and goals and actions that reflect the adoption of new technologies and programs to reduce GHG emissions.~~

~~**UPDATING PROJECT REVIEW CHECKLIST**~~

~~The Project Review Checklist will be finalized by the City of Carlsbad and updated as necessary to reflect lessons learned through project streamlining. Federal, state, and San Diego Air Pollution Control District actions will be monitored to identify future changes to federal or state standards or guidelines that affect implementation of the CAP. Any changes to California Environmental Quality Act (CEQA) Guidelines will also be integrated into the Project Review Checklist.~~

~~*5.1*~~*5.3 Project Review Thresholds and Checklist*

COMPLIANCE WITH CAP

During the course of project review, city will evaluate whether a project is subject to provisions of this CAP, using the screening criteria below. Once this is established, a project can comply with the CAP in one of two ways:

- **Checklist Approach.** The Project Review Checklist below provides direction about measures to be incorporated in individual projects, which will be used during the normal development review process. Project features that help a project meet the provisions of the CAP would then become part of project conditions of approval.
- **Self-Developed Program Approach.** Rather than use the standard checklist, project proponents can develop their own program that would result in the same outcome as the checklist~~; approval would be subject to city review.~~ Appendix E provides a non-exclusive list of potential mitigation measures that can be applied at the project level to reduce project-level greenhouse gas emissions. Other measures not listed in the Appendix may be considered, provided that their effectiveness in reducing greenhouse gas emissions can be demonstrated. The self-developed program approach and selection of mitigation measures would be subject to city review and approval.

CEQA STREAMLINING

Project Screening Thresholds

The California Air Pollution Control Officers Association (CAPCOA) published various screening thresholds to guide lead agencies in determining which projects require greenhouse gas analysis and mitigation for significant impacts related to climate change. Utilizing this guidance, the City has determined that new development projects emitting less than 900 $MTCO_2e$ annual GHG would not contribute considerably to cumulative climate change impacts, and therefore do not need to demonstrate consistency with the CAP. Table 5-2 lists types and sizes of projects that

correspond to the 900 $MTCO_2e$ screening threshold; projects equal to or exceeding these thresholds would be subject to CAP measures.[53]

Table 5-2: Project Review thresholds

Project/Plan Type	*Screening Threshold*
Single-Family Housing	50 dwelling units
Multi-family Housing	70 dwelling units
Office	35,000 square feet
Retail Store	11,000 square feet
Grocery Store	6,300 square feet

Source: Adapted from California Air Pollution Control Officers Association (CAPCOA). CEQA and Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act (January 2008).

Note: For project types not listed in this table, the need for GHG analysis and mitigation will be made on a project-specific basis, considering the 900 $MTCO_2e$ screening threshold.

Project Review Checklist

For proposed projects above the screening thresholds, project proponents should complete the CAP Project Review Checklist (similar to that shown in Table 5-~~2~~3). For each item on the checklist, project proponents should indicate whether or not the measure is included as part of the project, or if it is not applicable. The checklist is designed to meet the targets set for the measures presented in Chapter 4. The checklist shown in Table 5-3 is preliminary and illustrative of the items that will be included in the finalized checklist. The city will provide a final checklist incorporating requirements in ordinances drafted for the CAP.

[53] If a proposed project is below the screening criteria, GHG emissions would still be reduced through compliance with applicable City of Carlsbad General Plan goals and policies, ordinances and regulations.

Table 5-~~2~~3: PRELIMINARY CAP PROJECT REVIEW CHECKLIST		
RENEWABLE ENERGY PRODUCTION		
1. For new nonresidential projects with more than 50 cars surface parked or on roofs of parking structures, would the project include PV panels over at least half of the surface/roof-parked cars or other equivalent renewable energy production?	☐ Included	☐ Not Applicable
Explanation: *Describe the measures taken to meet this requirement, if applicable.*		
COGENERATION		
2. For the construction or retrofit of a large commercial or industrial facility with an on-site electricity production, would the proposed project include a building cogeneration system?	☐ Included	☐ Not Applicable
Explanation:		
ENERGY CONSERVATION ORDINANCES		
3. For residential and commercial construction or renovations in excess of $50,000, would the proposed project meet the requirements in the applicable energy conservation ordinance?	☐ Included	☐ Not Applicable
Explanation:		
GREEN BUILDING CODE		
4. Would the proposed project meet the energy efficiency standard of 5 percent above Title 24 standards (CALGreen)?	☐ Included	☐ Not Applicable
Explanation:		

Table 5-~~2~~3: PRELIMINARY CAP PROJECT REVIEW CHECKLIST		
SOLAR WATER HEATERS/HEAT PUMPS		
5. For residential and commercial projects, does the project include solar water heaters to reduce the energy needed for residential water heating by 50 percent, or heat pumps to reduce the heating/cooling load by 50 percent?	☐ Included	☐ Not Applicable
Explanation:		
TRANSPORTATION DEMAND MANAGEMENT		
6. For proposed projects that meet the minimum trip generation thresholds set in the City of Carlsbad Transportation Demand Management (TDM) ordinance, does the project include a TDM plan, containing a description of how minimum alternative mode use will be achieved and maintained over the life of the project?	☐ Included	☐ Not Applicable
Explanation: *Include TDM plan if applicable.*		
ZERO-EMISSIONS VEHICLES		
7. For proposed projects subject to the City of Carlsbad off-street parking requirements, does the proposed project provide preferential parking for electric vehicles and/or charging stations for electric vehicle use?	☐ Included	☐ Not Applicable
Explanation:		
OTHER GHG REDUCTION MEASURES AND/OR FEATURES		
8. Describe other GHG reductions measures and/or features of the proposed project:	☐ Included	☐ Not Included
Explanation:		

A completed CAP Project Review Checklist, including supporting documentation for applicable measures, demonstrates a proposed project complies with the CAP.

As an alternative to utilizing the Project Review Checklist, a project proponent may develop a project-specific GHG emissions reduction program that would achieve the same required GHG reductions. Appendix E to the CAP provides a non-exclusive list of mitigation measures which may be considered by a project proponent for inclusion in a project-specific GHG emissions reduction program. The reduction measures identified in the CAP and Appendix E are non-exclusive, and other effective reduction measures may be available or become available in the future. The type, character, and level of mitigation would depend on the project type, size, location, context, and other factors. The availability of mitigation measures changes over time, as well, with new technologies, building materials, building design practices, and other changes. Therefore, in developing project-specific reductions measures, the city recommends that a project proponent refer to current guidance from CAPCOA, ARB, OPR, California Attorney General, and SANDAG to determine applicable mitigation measures and estimate their effectiveness (see references in Appendix C).

UPDATING PROJECT REVIEW CHECKLIST

The Project Review Checklist will be finalized by the City of Carlsbad during the first year of CAP implementation, and updated as necessary to reflect lessons learned through project streamlining. Federal, state, and San Diego Air Pollution Control District actions will be monitored to identify future changes to federal or state standards or guidelines that affect implementation of the CAP. Any changes to California Environmental Quality Act (CEQA) and CEQA Guidelines will also be integrated into the Project Review Checklist.

APPENDIX C: REFERENCES

Modify Appendix C as follows:

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APPENDIX D: APPLICABLE GENERAL PLAN POLICIES

Modify Appendix D as follows (and adjust other policy numbers as necessary):

Page 2

…

2-P.4~~8~~6 Enhance walkability on a citywide scale by installing benches and transit shelters and adding landscaping, wayfinding signage, public art, and pedestrian-scaled lighting. Consider ways to improve rail and freeway overpass/ underpass areas, with lighting, sidewalk improvements and public art ~~installations~~.

Page 4

…

~~2-P.85 Allow small pockets of higher-density residential at the edges of the corridor, as shown on the Land Use Map, to enable residents to live closer to jobs, with opportunities for enhanced bicycle and pedestrian paths that link residential and employment uses. Ensure that residential uses incorporate noise attenuation criteria in accordance with the Airport Land Use Compatibility Plan.~~

…

3-P.13~~1~~ Evaluate implementing a road diet to three lanes or fewer for existing four-lane streets currently carrying or projected to carry 25,000 average daily traffic volumes or less in order to promote biking, walking, safer street crossings, and attractive streetscapes. Before implementing a road diet, the city shall solicit and consider public input, and evaluate the trade-offs between safety, auto service levels, bicycle/pedestrian/transit service levels.

…

Page 7

3-P.33~~1~~ Partner with other agencies and/or developers to improve transit connectivity within Carlsbad. As part of a comprehensive transportation demand management (TDM) strategy and/or with transit oriented development (TOD), a shuttle system could be established that connects destinations and employment centers like LEGOLAND, hotels, the Village, McClellan-Palomar Airport, business parks, the COASTER and Breeze transit stations, public activity centers (such as senior centers, city hall, libraries, etc.) and key destinations along the coast. The system could incorporate shuttle service in adjacent cities to maximize connectivity.

…

APPENDIX E: PROJECT LEVEL MITIGATION MEASURES

Add Appendix E as follows:

PROJECT LEVEL MITIGATION MEASURES

In addition to the programmatic measures contained in this Climate Action Plan, the following is a non-exclusive list of mitigation measures that can be applied at the project level to reduce greenhouse gas emissions. These measures, and other measures not listed in this Appendix which may become available, are intended to assist projects in meeting the performance standard of reducing their greenhouse gas emissions to the level required by federal, state and local law, including the emission reduction targets established in this Climate Action Plan. The city and project applicants may consider these and other project-level mitigation measures, provided that their effectiveness in reducing greenhouse gas emissions can be demonstrated and they are otherwise consistent with all applicable policies and ordinances (e.g., a mixed-use project that is permissible by the zoning ordinance). Sources for additional potential mitigation measures may include those listed in: CAPCOA's "CEQA and Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act (January 2008)"; the Attorney General's "Addressing Climate Change at the Project Level"; OPR's CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA)"; and SANDAG's "Draft Climate Change Mitigation and Adaptation White Paper (2014)". Please see Appendix C for complete references.

Renewable Energy

- Provide onsite renewable energy system(s). Nonpolluting and renewable energy potential includes solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies
- Include in new buildings facilities to support the use of low/zero carbon fueled vehicles, such as the charging of electric vehicles from green electricity sources
- Provide solar water heaters

Green Building

- Meet recognized green building and energy efficiency benchmarks such as LEED and ENERGY STAR
- Incorporate materials which are resource efficient, recycled, with long life cycles and manufactured in an environmentally friendly way

Energy Efficiency

- Exceed Carlsbad Green Building Code (Title 24) mandatory efficiency requirements by 15% or more
- Install light colored "cool" roofs (e.g. Energy Star roofing) or other highly reflective, highly emissive roofing materials
- Install a vegetated ("green") roof that covers at least 50% of roof area

- Design project to maximize solar orientation (i.e., 75% or more building face north or south; include roof overhangs that block high summer sun, but not lower winter sun, from penetrating south-facing windows
- Plant trees and vegetation near structures to shade buildings and reduce energy requirements for heating/cooling
- Install energy-reducing ceiling/whole-house fans
- Install energy efficient lighting (e.g., light emitting diodes (LEDs)), heating and cooling systems, appliances, equipment, and control systems. (e.g., Energy Star)
- Install energy-reducing programmable thermostats that automatically adjust temperature settings

Transportation

- Develop commute trip reduction plans that encourage employees who commute alone to consider alternative transportation modes
- Create an online ridesharing program that matches potential carpoolers immediately through email
- Provide fair-share funding of transportation improvements
- Provide shuttle service or public transit incentives such as transit passes to decrease work-related auto trips
- Provide "end-of-trip" facilities including showers, lockers, and changing space (nonresidential projects)
- Incorporate public transit into project design
- Incorporate bicycle lanes, routes and facilities into street systems, new subdivisions, and large developments
- Provide amenities for non-motorized transportation, such as secure and convenient bicycle parking
- Provide plentiful short- and long-term bicycle parking facilities (nonresidential projects)
- Provide long-term bicycle parking is provided at apartment complexes or condominiums without garages
- Create pedestrian (and/or bicycle) access network that internally links all uses and connects to all existing/planned external streets and pedestrian (and/or bicycle) facilities contiguous with the project site
- Provide a parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances
- Provide parking for EVs/CNG vehicles
- Install EV charging facilities

Water Conservation

- Install water-efficient fixtures and appliances such as low-flow fixtures, dual flush toilets, and other water efficient appliances
- Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls and use water-efficient irrigation methods
- Implement low-impact development practices that maintain the existing hydrology of the site to manage storm water and protect the environment
- Incorporate recycled/reclaimed water for landscape irrigation and other non-potable water use needs
- Incorporate rain barrels and gray water systems for landscape irrigation

Landscaping

- Install native and drought tolerant plant materials into landscapes
- Incorporate into landscapes drought resistant native trees, trees with low emissions and high carbon sequestration potential
- Provide parking lot areas with 50% tree cover within 10 years of construction, in particular low emitting, low maintenance, native drought resistant trees. Reduces urban heat island effect
- Dedicate space for neighborhood gardening

Mixed-Use:

- Development projects predominantly characterized by properties on which various uses, such as office, commercial, institutional, and residential, are combined in a single building or on a single site in an integrated development project with functional interrelationships and a coherent physical design; or projects that have at least three of the following on site and/or offsite within one-quarter mile: residential development, retail development, office, transit, park, or open space
- Provide on-site shops and services for employees, as permitted by zoning and development standards

Solid Waste Measures

- Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard).
- Provide interior and exterior storage areas for recyclables and green waste and adequate recycling containers located in public areas.
- Provide education and publicity about reducing waste and available recycling services.