



Climate Action Plan Update

GHG Emissions Reductions Technical Evidence

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1 Introduction

This report presents the technical quantification and evidence supporting the greenhouse gas (GHG) emissions reduction potential of the City of Santa Barbara’s Climate Action Plan (CAP) Update.

Section 15183.5(b)(1) of the California Environmental Quality Act (CEQA) guidelines establishes several criteria which a CAP must meet to be considered a “qualified GHG reduction plan” and allow for programmatic CEQA streamlining of project GHG emissions. This document provides the evidence substantiating the GHG emissions reductions associated with the CAP Update measures pursuant to Subsection (D) of the statute, which states, “measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.” Based on the substantial evidence contained in this report, the GHG emissions reductions associated with the measures in the CAP Update are sufficient to meet and exceed the City of Santa Barbara’s fair share of GHG emissions consistent with the reduction target established in 2022 by Senate Bill (SB) 32 of 40% below 1990 levels by 2030 and make substantial progress towards the City’s aspirational climate target of reaching carbon neutrality by 2035 (which exceeds California’s carbon neutrality target established by Assembly Bill [AB] 1279).

The quantification in this report is specifically intended to illustrate a viable path to achieving the state climate action target. As required in CEQA Guidelines Section 15183.5(b)(e), mechanisms to monitor the CAP’s progress toward achieving the GHG emission reductions provided in this report have been established through the CAP development process. If, based on the tracking of community GHG emissions, the City is not on track to reach the 2030 GHG reduction specified here or the City’s aspirational carbon neutrality goal, the CAP as a whole or specific measures and actions will be amended and a new CAP update will be prepared that includes altered or additional measures and actions, with evidence that their implementation can achieve the City’s climate action targets.

1.1 Climate Action Targets

The City of Santa Barbara’s climate action target of carbon neutrality by 2035 is more aggressive than California’s goals to reduce GHG emissions 40% below 1990 levels by 2030 (SB 32) and 85% below 1990 levels or net zero¹ by 2045 (AB 1279). Therefore, the City of Santa Barbara’s targets align with state legislation and this document focuses on the GHG emission reductions associated with 2030 and 2035. Future CAP updates will evaluate progress made towards the 2045 time horizon.

¹ Net-zero refers to a state of carbon neutrality GHG emissions (in units of carbon dioxide equivalent, or CO₂e), where a community’s GHG emissions have been reduced as much as possible, and any remaining GHG emissions arising from community-level activities are offset by GHG emissions sequestration activities and technologies, such as tree planting, compost application, or industrial practices that take GHG emissions out of the atmosphere and sequester them in solid or liquid form.

1.2 Measures and Actions Organization

As part of the CAP Update process, the City of Santa Barbara has developed a comprehensive set of measures reducing community wide GHG emissions in all sectors to achieve the City's climate action targets. Each measure is supported by a set of actions that provide measurable GHG emissions reduction that is supported by substantial evidence. The City has also developed a set of measures and actions for offsetting GHG emissions through carbon sequestration. AB 1757 requires California Natural Resources Agency (CNRA) to set carbon sequestration targets by 2024 as well as methodologies to track carbon sequestration effectiveness by 2025. Consequently, carbon sequestration measures and actions have been quantified when substantial evidence is available to affirm these reductions. Measures and actions are organized according to the following hierarchy:

1. **Sectors:** Sectors define the GHG emissions category in which the GHG reductions will take place and include Building Energy, Transportation, Solid Waste, Water, and Wastewater and Carbon Sequestration.
2. **Measures:** Measures are developed under each sector pursuant to the GHG Inventory and Forecast and in line with the Community Protocol and the California Air Resources Board (CARB) 2022 Climate Change Scoping Plan:
 - Building Energy
 - Transportation
 - Solid Waste, Water, and Wastewater
 - Carbon Sequestration

Additional measures developed for the City of Santa Barbara Climate Action Plan that are not quantified in emissions reductions include:

- Municipal Measures (are a part of each sector)²
- Community Climate Potential
- Administrative and Implementation

These measures are not quantified in this report because reductions would either be minor or could cause double counting of other measures and actions.

Measures and actions can be either quantitative or supportive, defined as follows:

- **Quantitative:** Quantitative measures and actions result in quantifiable GHG emissions reductions when implemented. GHG emissions reductions from these measures and actions are supported by case studies, scientific articles, calculations, or other third-party substantial evidence. Quantitative measures/actions can be summed to quantify how the City of Santa Barbara will meet its 2030 climate action target and demonstrate progress towards the 2045 target. GHG emissions reductions were calculated using published evidence provided through adequately controlled investigations, studies, and articles carried out by qualified experts that establish the effectiveness for the reduction measures and actions. The estimates and underlying calculations provided in this report provide the

² Note that the City's municipal measures as established in the CAP Update are not quantified within this document. The City's operations as demonstrations of climate action leadership, they contribute only minorly to community-level GHG emissions reductions and are a subset of the community GHG emissions. For this reason, the GHG emissions reductions expected from municipal measures were conservatively excluded from the analysis in this document and were not quantified as part of the CAP Update preparation process.

substantial evidence and a transparent approach to achieving the City’s GHG emissions reduction targets.

- **Supportive:** Supportive measures and actions may also be quantifiable and have substantial evidence to support their overall contribution to GHG reduction. However, due to one of several factors – including a low GHG reduction benefit, indirect GHG reduction benefit, or potential for double-counting– they have not been quantified and do not contribute directly to the expected GHG reduction target and consistency with the state goals. Despite not being quantified, supportive measures/actions are nevertheless critical to the overall success of the CAP and provide support so that the quantitative measures and actions will be successfully implemented.
- 3. **GHG Reduction Metrics:** Identify specific goals (i.e., activity data targets by 2030 and 2035) to address GHG emissions in each sector. Each quantifiable measure has at least one metric to track implementation and GHG emissions reductions. Each sector may have one or more measures with associated metrics. For example, three measures and metrics may be established under the Transportation sector to address active transportation, public transportation, and single-passenger vehicles subsectors.
- 4. **Actions:** Actions identify the programs, policies, funding pathways, and other specific commitments that the City of Santa Barbara will implement. Each measure contains a suite of actions, which together have been designed to accomplish the measure goal and metrics.
 - **Key Strategic Themes:** The actions supporting each measure have been designed around a set of key strategic themes. Each theme emphasizes specific criteria that have been proven to play an essential role in the implementation of the measure. Because community-focused climate action often requires community-level behavioral changes and buy-in to be implementable and successful, the City must design a suite of actions that support these changes by emphasizing specific needs of the community. The key strategic themes are: Structural Change, Education, Equity, Funding, Partnerships, and Feasibility Studies. In general, the actions under a single measure should collectively address all the key themes.³ Identification of the themes and their inclusion into the CAP helps plan for implementation. More information on the themes can be found in the CAP.

1.3 GHG Emissions Reductions

The GHG emissions reduction associated with the City of Santa Barbara CAP measures and actions have been calculated and presented in this report in terms of mass emissions (in units of MT CO₂e). Population projections are shown in Table 1 and give context to how emissions scale over time. Population growth well beyond these projections may require additional GHG reductions to achieve the City’s goals.⁴

³ The exception is for measures and actions in the municipal sector because the City has much more leverage to enact changes at a municipal level and may not need to consider each pillar to ensure success during implementation.

⁴ City of Santa Barbara’s climate action target of carbon neutrality by 2035 is more aggressive than California’s goals to reduce GHG emissions 85% below 1990 levels or net zero by 2045 (AB 1279). Therefore, City of Santa Barbara’s targets align with state legislation and this document does not include a discussion of 2045 reduction. Future CAP updates will evaluate progress made towards the 2045 time horizon.

Table 1 Population Projections for City of Santa Barbara¹

	2019	2030	2035
Population	87,670	96,637	100,713

¹ Population estimates for 2035 were provided by traffic consultant, Iteris. RE: Santa Barbara Housing Element Update – Draft CEQA Transportation Impact Analysis Memorandum. Dated December 22, 2022. The estimated 2035 population was then interpolated to get a 2019 and 2030 estimate.

A breakdown of the GHG emissions reductions calculated for each measure is included in Table 2.

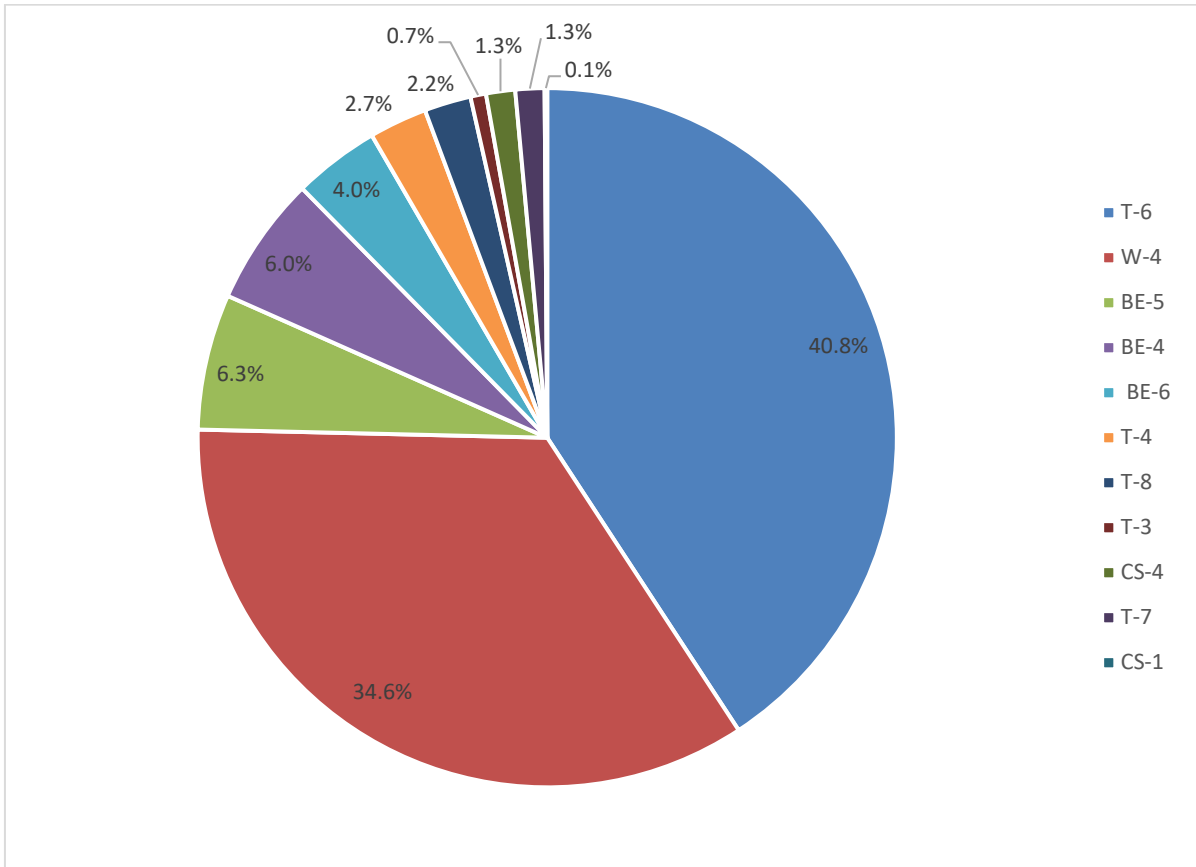
Table 2 Estimated GHG Emissions Reductions by Measure

Measure Number	GHG Emissions Reduction Measures	2030 Anticipated Reduction/ Sequestration (MT CO ₂ e)	2035 Anticipated Reduction/ Sequestration (MT CO ₂ e)
Building Energy			
BE-1 (Municipal)	Decarbonize 50% of municipal buildings and facilities by 2030 and all remaining municipal facilities by 2035	Supportive	Supportive
BE-2 (Municipal)	Procure carbon free or 100% renewable electricity for municipal operations by 2030	Supportive	Supportive
BE-3 (Municipal)	Increase municipally owned distributed renewable energy generation throughout the City	Supportive	Supportive
BE-4	Expand existing natural gas prohibition ordinance for new construction	7,918	12,975
BE-5	Reduce existing residential natural gas consumption by 10% below 2019 levels by 2030 and 17% below 2019 levels by 2035	8,306	14,410
BE-6	Reduce commercial natural gas consumption 10% below 2019 levels by 2030 and 18% below 2019 levels by 2035	5,288	9,307
BE-7	Increase the impact of Santa Barbara Clean Energy (SBCE)	Supportive	Supportive
Transportation			
T-1 (Municipal)	Continue to develop and implement the municipal Transportation Demand Management (TDM) program	Supportive	Supportive
T-2 (Municipal)	Electrify or otherwise decarbonize the municipal fleet by 2035	Supportive	Supportive
T-3	Implement programs that enhance access to safe active transportation, such as walking and biking, to increase active transportation mode share to 6% by 2030 and to 10% by 2035.	952	2,757
T-4	Implement programs to encourage public transportation to increase public transportation mode share to 7% by 2030 and to 8% by 2035.	3,547	4,641
T-5	Support and promote regional programs that reduce the use of single occupancy vehicles	Supportive	Supportive
T-6	Increase zero-emission passenger vehicle use and adoption to 30% by 2030 and to 55% by 2035	53,948	107,774
T-7	Accelerate zero-emission commercial vehicle use and adoption to 26% by 2030 and 45% by 2035	1,777	2,140
T-8	Electrify or otherwise decarbonize 6% of off-road equipment by 2030 and 20% by 2035	2,857	9,859

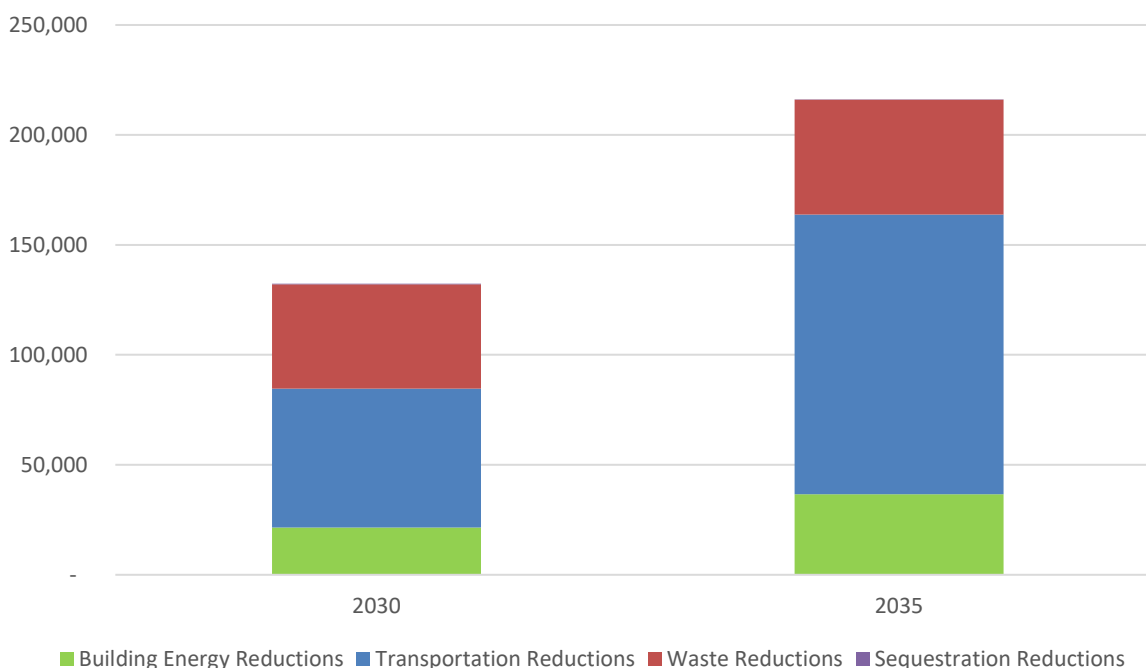
Measure Number	GHG Emissions Reduction Measures	2030 Anticipated Reduction/ Sequestration (MT CO ₂ e)	2035 Anticipated Reduction/ Sequestration (MT CO ₂ e)
Water, Solid Waste, and Wastewater			
W-1 (Municipal)	Increase municipal procurement of recovered organic waste products	Supportive	Supportive
W-2 (Municipal)	Reduce municipal water consumption	Supportive	Supportive
W-3	Reduce per capita potable water consumption 1.05% by 2030 and 1.58% by 2035	1.72	0.67
W-4 ¹	Reduce organic waste 80% below 2014 levels by 2030 and 85% by 2035	45,773	50,271
Carbon Sequestration			
CS-1	Increase carbon sequestration by maintaining existing trees and natural lands and by planting 4,500 new trees throughout the community by 2030	159	159
CS-2	Explore new carbon sequestration and carbon capture opportunities	Supportive	Supportive
CS-3	Maintain and expand existing restoration projects to sequester carbon through a 25-acre net increase in restored land areas by 2030	Supportive	Supportive
CS-4 ²	Increase carbon sequestration by applying 0.08 tons of compost per capita annually in the community through 2030 and 2035	1,778	1,853
CS-5	Reduce GHG emissions of residential and commercial building materials 20% by 2030 and a 40% by 2035 in line with AB 2446	Supportive	Supportive
Community Climate Potential			
CP-1	Encourage community innovation and empower the local green economy through investment in a green technology workforce	Supportive	Supportive
Administrative			
A-1 (Municipal)	Facilitate Climate Action Planning updates and supportive programming	Supportive	Supportive
A-2	Staff appropriately across sector-based programs and projects to fully source funds and implement actions	Supportive	Supportive
Total Reductions		132,305	216,147
Total Reductions (excluding ReSource Center reductions)		87,615	169,936
¹ Measure includes continued use of Santa Barbara ReSource Center that as of 2021 met SB 1383 compliance obligation of 75% diversion of organic waste. Intent of measure is to exceed SB 1383 compliance obligation.			
² Measure includes continued use of Santa Barbara ReSource Center that as of 2021 met the 100% of the procurement target. Intent of measure is to continue to meet 100% of procurement target.			

GHG emissions reductions calculated for each measure included in Table 2 is shown below in Figure 1 to visualize the contribution of each measure. As shown in Figure 1, T-6 and W-4 result in the most GHG emissions in 2030. Overall, most GHG emissions reductions come from the transportation sector followed by the waste sector, energy sector, and sequestration sector, as shown in Figure 2.

Figure 1 Estimated GHG Emissions Reduction Percentages by Measure in 2030⁵



⁵ Measure W-3 Reduce per capita potable water consumption 1.05% by 2030 and 1.58% by 2035 is not included in this graph because the contribution is less than 0.00% of the total reductions.

Figure 2 Estimated GHG Emissions Reductions by Sector 2030 and 2035 (MT CO₂e)

1.4 GHG Emissions Reductions Compared to Targets

Together, the measures and actions in the CAP provide the City of Santa Barbara with the GHG reductions necessary to meet the state target of 40% below 1990 levels by 2030 (SB 32) (Table 3). However, the 2035 GHG emissions reductions quantified in this report are not yet enough to meet the City’s aspirational climate action target of carbon neutrality by 2035. Achieving carbon neutrality will require significant changes to the technology and systems currently in place. The CAP aims to establish new systems that are resilient and equitable and allow for a transition to carbon neutrality in the future. This includes electrification of building and transportation systems, support for land use policies and growth policies that reduce vehicle miles traveled, increased usage of carbon neutral electricity, increased water use efficiency, and waste reduction and diversion. As these measures and actions are implemented, the City will gain more information, new technologies will emerge, and current pilot projects and programs will scale to the size needed to reach carbon neutrality. Furthermore, the state is expected to update state-level regulations and provide additional support for meeting carbon neutrality in the future. Future CAP updates past 2030 will also outline new measures and actions that the City of Santa Barbara will implement to close the remaining gap to achieve the carbon neutrality target.

1.4.1 Benefits of SBCE

In addition to the State legislation expected to reduce GHG emissions in the City of Santa Barbara, the City also began receiving carbon-free electricity through Santa Barbara Clean Energy (SBCE) in 2021. Both tiers offered by SBCE are carbon-free, giving an emission factor of 0 MT CO₂e kWh.⁶ Participation is extremely high; both residential and commercial customers have demonstrated an opt out rate of 5%. By receiving electricity from a carbon-free source now, the City of Santa Barbara

⁶ SBCE 2021 Power Content Label: <https://www.energy.ca.gov/filebrowser/download/4668>

significantly decreases their electricity emissions to near zero in the short term ahead of SB 100 requirements. These expected reductions from enrollment in SBCE are included in Table 3. GHG reductions associated with switching to SBCE carbon-free energy accounts for a reduction of 75,608 MT CO₂e in 2030 and 19,586 MT CO₂e in 2035. SBCE carbon-free energy also provides the foundation needed for the electrification of buildings and vehicles which are both main pathways for GHG emission reduction in this CAP. For information see the *Santa Barbara GHG Inventory, Targets, and Forecast Memorandum*.

1.4.2 Resource Center

As of 2021, Santa Barbara’s ReSource Center, a state-of-the-art waste management facility, came online to increase the community’s recycling rate to above 85%, generate resources, such as green energy and compost, and dramatically lower local greenhouse gas emissions. The ReSource Center converts commercial and residential waste into resources by recovering recyclable materials, transforming organics into landscape nutrients, and creating renewable energy in the process.

Even though the ReSource Center has come online, it is still working towards the GHG emission reductions associated with meeting SB 1383 requirements, which lay out specific programs, policies, and objectives for cities to support the state’s goal of a 75% reduction from 2014 levels in organics waste by 2025. Therefore, the emission reductions associated with the ReSource Center are not included in the Business-as-Usual or Legislative Adjusted Forecast provided in Table 3. The expected reductions from continued use of the ReSource Center to achieve SB 1383 compliance are included in Table 3 for informational purposes. GHG reductions associated with the ReSource Center accounts for a reduction of 44,690 MT CO₂e in 2030 and 46,210 MT CO₂e in 2035. Reductions associated with the ReSource Center organic waste diversion are included as part of Measure W-4 discussed in further detail in Section 4 *Water, Solid Waste, and Wastewater* of this report. Reductions associated with the ReSource Center procurement compliance are included as part of Measure CS-4 discussed further in detail in Section 5 *Carbon Sequestration* of this report.

1.4.3 Overall Reductions to Meet Targets

Table 3 provides the results summary of the GHG emissions forecast for the City of Santa Barbara, including the BAU Forecast and the Legislative Adjusted Forecast, as well as the reductions anticipated from continued implementation of existing local programs including SBCE and ReSource Center, and the reductions expected from implementation of the CAP measures and actions. It also provides the City of Santa Barbara’s 2030 target to meet SB 32, which is consistent with developing a “qualified GHG reduction plan” by establishing a target below which GHG emissions are considered less than significant (Section 15183.5(b)(1) of the CEQA guidelines). The estimated total GHG emission reductions associated with full implementation of this plan exceeds the City’s 2030 SB 32 target. However, the actions identified in this plan do not achieve the City’s ambitious 2035 target for carbon neutrality. Additional actions will need to be identified over time as new legislation, technologies, and programs are put in place.

As shown in Figure 1, T-6 and W-4 result in the most GHG emissions in 2030. Consequently, implementation of Measure W-4, which includes the ReSource Center meeting SB 1383, would cause the City to achieve its SB 32 goal; however, implementation of additional measures and actions in the CAP would result in further reductions that work towards meeting the City’s 2035 carbon neutrality target.

Table 3 Targets Versus GHG Emissions Reductions

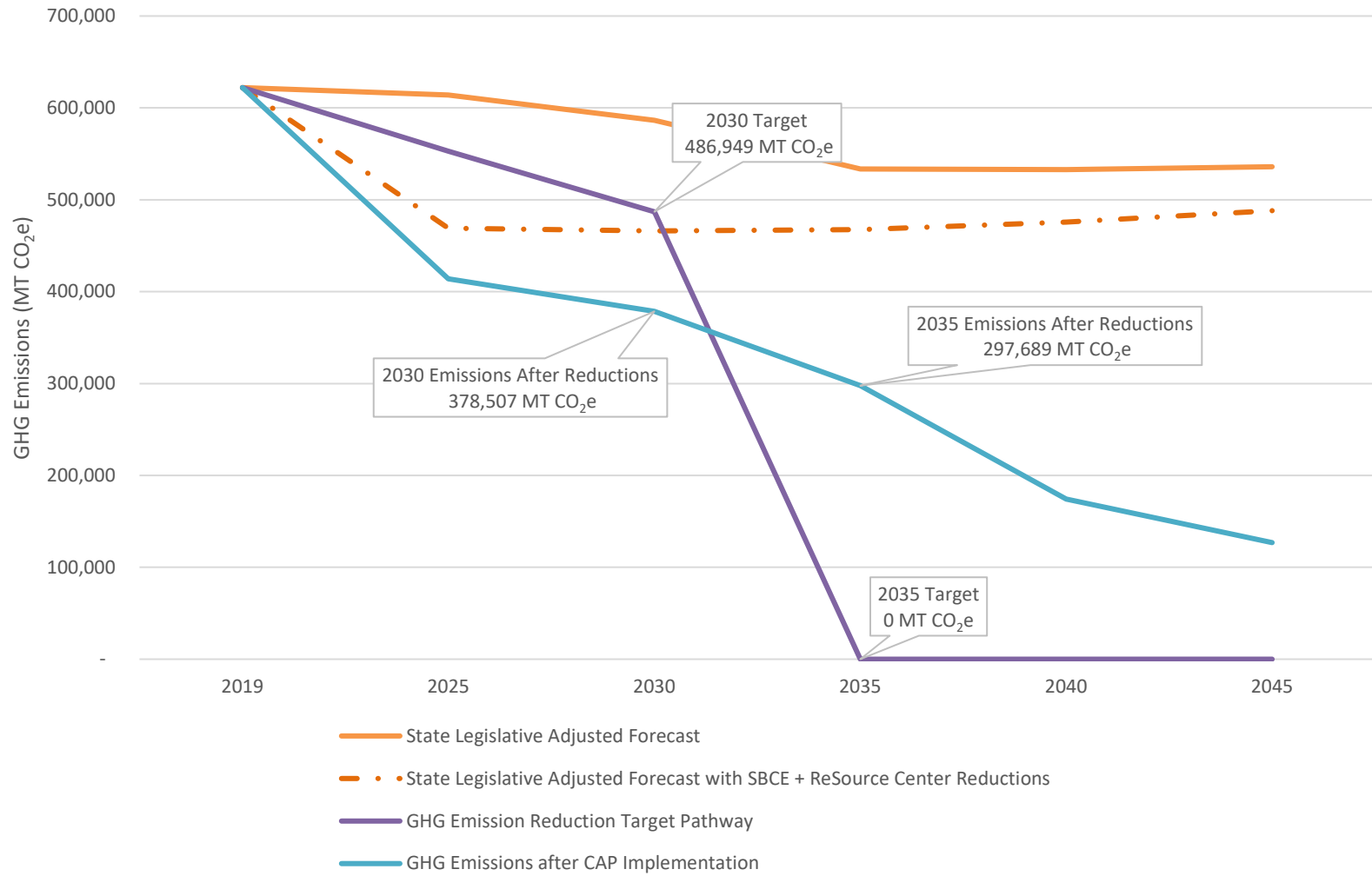
Target/Forecast	2030 GHG Emissions (MT CO₂e)	2035 GHG Emissions (MT CO₂e)
Business-as-usual Forecast	698,596	734,467
GHG Emission Reductions from State Laws/Programs	(112,176)	(201,046)
State Legislative Adjusted Forecast	586,420	533,421
GHG Emission Reductions from SBCE	(75,608)	(19,586)
GHG Emission Reductions from ReSource Center ¹	(44,690)	(46,210)
GHG Emissions after implementation of State legislation, SBCE, and ReSource Center	466,122	467,625
GHG Emissions Reductions from Full Implementation of Measures (excluding ReSource Center reductions) ²	(87,615)	(169,936)
GHG Emissions after Implementation of State Laws/Program, SBCE, ReSource Center, and remaining Measure Reductions	378,507	297,687
City of Santa Barbara Target	486,949	0.0
Target Met?	Yes	No – Additional actions will be needed to meet the aspirational 2035 target

MT CO₂e = metric tons of carbon dioxide

1. The GHG reductions achieved with continued status quo operation of the ReSource Center, which is meeting SB 1383 organic diversion and procurement requirements since 2021, is separated from the rest of the Measures presented in this CAP for informational purposes.
2. Because the GHG reductions associated with the ReSource Center are presented separate from the rest of the CAP Measures in this table, only the reductions from the remaining Measures are presented herein to avoid double counting of reductions.

Figure 3 shows the climate action targets in relation to the City's GHG emissions after measure implementation. Although the actions identified in this plan do not achieve the City's ambitious 2035 target for carbon neutrality; Figure 3 shows how implementation of these actions would make substantial progress toward the 2035 target. Additional actions will need to be identified over time as new legislation, technologies, and programs are put in place. A complete description of each measure and its contributing actions is included in the remainder of the report.

Figure 3 Targets Versus GHG Emissions Reductions



2 Building Energy Measure

The Building Energy Measure is focused on reducing natural gas consumption through the electrification of the building stock. This leverages the renewable energy portfolio offered by SBCE's 100% carbon-free energy plan (100% Green)⁷. All-electric buildings are powered 100% by electricity and when coupled with renewable electricity generation, their operational energy footprint becomes GHG emissions-free. The CAPUpdate's energy measures based on this strategy are as shown in Table 4 below.

Table 4 Building Energy Measures

Measure Number	GHG Emissions Reduction Measures	Anticipated Reduction/ Sequestration (MT CO ₂ e)
BE-1 (Municipal)	Decarbonize 50% of municipal buildings and facilities by 2030 and all remaining municipal facilities by 2035	Supportive
BE-2 (Municipal)	Procure carbon free or 100% renewable electricity for municipal operations by 2030	Supportive
BE-3 (Municipal)	Increase municipally owned distributed renewable energy generation throughout the City	Supportive
BE-4	Expand existing natural gas prohibition ordinance for new construction	2030: 7,918 2035: 12,975
BE-5	Reduce residential natural gas consumption by 10% below 2019 levels by 2030 and 17% by 2035	2030: 8,306 2035: 14,410
BE-6	Reduce commercial natural gas consumption 10% below 2019 levels by 2030 and 18% by 2035	2030: 5,288 2035: 9,307
BE-7	Increase the impact of Santa Barbara Clean Energy (SBCE)	Supportive

These Building Energy Measures provide the framework of updated regulations, programs, funding mechanisms, education, and advocacy to drive electrification of both new and existing residential and commercial buildings. SBCE procures low or no-carbon renewable energy for the community through renewable energy portfolios that contain sources like wind and solar. Using electricity from SBCE instead of natural gas, propane, or other electricity sources to power buildings reduces the GHG emissions associated with building operations to zero or near-zero. Measure BE-7 supports the City to maintain high levels of participation in SBCE, which increases the GHG reduction potential for SBCE's renewable electricity. Santa Barbara's building stock currently relies heavily on natural gas, therefore, GHG emissions from the City's existing buildings must also be reduced to achieve the City's climate action targets.

⁷ Building electrification consists of converting building appliances, such as space heaters, boilers, stoves, clothes dryers, and hot water heaters, that are currently powered by natural gas or propane to electricity as the primary energy source. This most often consists of retrofitting a building to support more electric capacity and replacing natural gas or propane appliances with electric-powered alternatives.

Measure BE-1 (Municipal) Decarbonize 50% of Municipal Buildings and Facilities by 2030 and All Remaining Municipal Facilities by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
BE-1.1	Feasibility Study	Develop a plan to electrify 50% of City-owned municipal buildings by 2030 and decarbonize 100% of municipal facilities by 2035. The plan will include an inventory of fossil fuel-powered municipal building equipment, low/zero-carbon technologies available for replacing the equipment (where available), and a short- and long-term schedule for completion. Address diesel generators and recent natural gas investments. Address feasibility concerns around community swimming pool decarbonization. Any buildings that are unable to be electrified due to technological infeasibility should be decarbonized with other technology.	Supportive
BE-1.2	Structural Change	By 2031, develop an ordinance to require the installation of solar and/or energy storage backup power instead of diesel generators, where feasible.	Supportive
BE-1.3	Structural Change	Implement the municipal building decarbonization plan developed under BE-1.1 to decarbonize 100% of municipal buildings by 2035 (any buildings that are unable to be electrified due to technological infeasibility shall be decarbonized with other technology).	Supportive
BE-1.4	Structural Change	Develop and implement a plan for retrofitting all remaining streetlights, facility lighting, and traffic signals to LEDs by 2035.	Supportive
BE-1.5	Foundational, Funding	Leverage the grant writer position(s) in strategy A-2.2 to expand funding efforts for municipal decarbonization.	Supportive
BE-1.6	Structural Change	Include, at the time of lease renewal, requirements for City-owned leased buildings and facilities to be all-electric.	Supportive

Measure BE-1 involves the City leading by example and includes actions to decarbonize the buildings that are owned and operated by the City. These actions are similar to the community decarbonization actions described in Measure BE-4. This measure is not quantified because the overall GHG emission reductions from building electrification are already accounted for in the community GHG emission reduction estimate.

Measure BE-2 (Municipal) Procure Carbon Free or 100% Renewable Electricity for Municipal Operations by 2030

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
BE-2.1	Foundational	Require all municipal electrical accounts to remain in SBCE's 100% Green option and purchase carbon-free electricity.	Supportive

Measure BE-2 involves the City leading by example and ensures that all City operations are powered by carbon free or 100% renewable electricity by 2030. This measure is not quantified because the overall GHG emission reductions from building electrification are already accounted for in the community GHG emission reduction estimate.

Measure BE-3 (Municipal) Increase Municipally Owned Distributed Renewable Energy Generation throughout the City

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
BE-3.1	Foundational, Feasibility Study	Implement all feasible microgrid projects at municipal facilities as identified by the 2017 Zero Net Energy study and re-evaluate viability of additional facilities.	Supportive
BE-3.2	Feasibility Studies	Conduct a feasibility study to understand barriers to installing additional distributed energy resources such as solar and battery storage, or other renewable energy generation infrastructure, at municipal facilities. Plan for directing resources through the City for funding, energy storage, and distributed energy resources. Direct municipal efforts to sourcing space for energy storage projects and microgrid implementation.	Supportive

Measure BE-3 involves the City leading by example to increase energy capacity and resilience through improving the microgrid and increasing battery storage. This measure is not quantified because microgrids do not inherently reduce GHG emissions. However, they do support a resilient and fully electrified City.

Measure BE-4 Expand Existing Natural Gas Prohibition Ordinance for New Construction

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
BE-4.1	Structural Change	In 2025 and every 3-years thereafter, revisit building ordinances to update the scope and exemptions to align with industry technology and maximize GHG reduction. Examples include requiring all major remodels (over 50% of building effected or an addition of over 50% of gross floor space) and removing exemptions in the all-electric building requirements. The building code cycle updates are processed in 2025, effective in 2026, and updated every 3-years.	2030: 7,918 2035: 12,975

Measure BE-4 has only one Action (BE-4.1) and involves the City updating their Natural Gas Prohibition (Municipal Code Chapter 22.110) that applies to all building permits submitted on or after January 1, 2022, and prohibits natural gas infrastructure in all newly constructed buildings. The City must actively study the Natural Gas Prohibition ordinance every 18 months and may update the ordinance periodically as needed. The ordinance consists of amendments to local health and safety municipal codes and does not amend the State Energy or Green Building Code. Other supporting actions as part of Measures BE-5, BE-6, and BE-7 (e.g., BE-5.11, BE-6.4, BE- 7.1) also ensure the City provides community resources and education on electrification to further strengthen the implementation of the Natural Gas Prohibition ordinance.

The methods and assumptions used to calculate the GHG emissions reductions associated with this metric are explained further here and shown in Table 5 below. The GHG emissions reduction

benefits associated with building electrification of new construction were quantified by estimating the increase in gas use from 2021 to 2030 and 2035, based on the adjusted forecast which does not include the City’s Natural Gas Prohibition to ensure there is not double counting of emission reductions. These emissions are expected to be replaced primarily with carbon-free electricity.⁸ Reductions associated with Measure BE-4 and supporting actions assume no exemptions for new residential and commercial buildings even though the current Natural Gas Prohibition does allow exemptions for restaurants, clean rooms, laboratories, and projects where electrification is not feasible. We assumed Measure BE-4 will reevaluate and remove these exemptions as electrification technology is more available and consequently, we did not assume any exemptions in the reduction calculation.

Table 5 GHG Emissions Reductions from Measure BE-4

Inputs and Assumptions		
Implementation year for residential development		2022
Implementation year for commercial development		2022
Natural gas emission factor (MT CO ₂ e/therm) ¹		0.00531
Natural gas fugitive emissions factor (MT CO ₂ e/therm) ²		0.05307
Convert kWh to therms (kWh/therm) ³		29.3
Average increased efficiency of electric appliances over natural gas appliances (%) ³		300%
GHG Emissions Reductions Calculations	2030	2035
Residential Reductions		
Forecasted residential NG usage (therms) ⁴	13,223,176	13,768,839
NG usage in implementation year (therms) ⁴	12,350,115	12,350,115
NG usage avoided (therms)	873,061	1,418,724
Emissions from NG usage avoided (MT CO ₂ e)	4,637	7,535
Emissions from methane leakage avoided (MT CO ₂ e)	1,297	2,108
Electricity usage from converting to electric (kWh)	8,526,894	13,856,203
Weighted electricity EF (lbs CO ₂ e/MWh) ⁵	16.91	4.23
Emissions from converted electricity usage (MT CO ₂ e)	65	27
Residential emission annual reductions (MT CO₂e)	5,869	9,617
Commercial Reductions		
Commercial NG usage (therms) ⁴	8,098,368	8,288,888
NG usage in implementation year (therms) ⁴	7,793,538	7,793,358
NG usage avoided (therms)	304,831	495,350
Emissions from NG usage avoided (MT CO ₂ e)	1,619	2,631
Emissions from methane leakage avoided (MT CO ₂ e)	453	736
Electricity usage from converting to electric (kWh)	2,977,182	4,837,920
Weighted electricity EF (lbs CO ₂ e/MWh) ⁵	16.91	4.23
Emissions from converted electricity usage (MT CO ₂ e)	23	9
Commercial emission annual reductions (MT CO₂e)	2,049	3,358
Total Annual Reductions (MT CO₂e)⁶	7,918	12,975

Notes: MT CO₂e = metric tons of carbon dioxide; kWh = kilowatt-hour

¹ EPA’s Emission Factors for Greenhouse Gas Inventories

⁸ 95% of electricity provided to the City of Santa Barbara is obtained from SBCE and is carbon-free. The remaining 5% of electricity is served by SCE. A weighted emission factor to account for 95% of the electricity coming from SBCE and 5% of SCE was used for emission reduction calculations.

² Calculated by multiplying cubic meter of natural gas per therm (2.85) [source: <https://www.abraxasenergy.com/energy-resources/toolbox/conversion-calculators/energy/>] by density of natural gas (0.000712 MT/ cubic meter) [source: <https://www.unitrove.com/engineering/tools/gas/natural-gas-density>] by methane content of natural gas (94.9%) [source: North American Energy Standards Board]. Adjusted for GWP of CH4.

³ Conversion factor of 29.3001 kWh/therms and the assumption that electric appliances are generally three time more efficient than gas appliances obtained from <https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump->.

⁴ Values obtained from *City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum*

⁵ Electricity emission factors are weighted averages of the SBCE and SCE forecasted emission actors in the target year assuming 95% of electricity is from SBCE based on current opt out rate of 5%.

Measure BE-5 Reduce Existing Residential Natural Gas Consumption by 10% Below 2019 Levels by 2030 and 17% Below 2019 Levels by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e) ¹
BE-5.1	Structural Change	Adopt a time of renovation energy efficiency and electrification requirement by 2025, effective 2026. This ordinance could require replacement of HVAC systems, hot water heaters, and other appliances to be all electric and low hydrofluorocarbons (HFC) gas emitters or provide a checklist of cost-effective efficiency and electrification options for renovations to complete based on the scope of the project. Adopt an electrification ordinance for existing residential buildings by 2028, effective 2029, to be implemented through the building permit process, which bans expansion or reconnection of natural gas infrastructure.	2030: 426 2035: 859
BE-5.2	Feasibility Studies, Education, Equity	Complete an existing building electrification feasibility analysis in collaboration with UCSB or another research institution by 2025 to determine the upfront and on-bill costs associated with building electrification strategies. This information will be used to inform and support future ordinances addressing existing building electrification as well as the building electrification accelerator (BE-5.3). The study will include extensive community input and an equity analysis to ensure all people have affordable access to the health, comfort, economic, and resilience benefits of building electrification.	
BE-5.3	Structural Change, Education, Equity	Create a residential building electrification accelerator program to increase community access to building electrification resources. This program should include the provision and expansion of resources needed to support residents in electrifying their homes. For example, by providing rebates, enhanced funding for income-qualified homeowners, technical expertise, and contractor support.	2030: 7,880 2035: 13,551 (reductions associated with combined actions of Action 5.2-5.18)
BE-5.4	Feasibility Study, Structural Change	Identify opportunities for the strategic reduction of gas infrastructure within the City and develop a gas infrastructure pruning pilot program.	
BE-5.5	Structural Change, Education, Equity	Complete a low income and affordable housing electrification pilot project in collaboration with affordable housing owners, utilities, and the community. The pilot project will ensure no increase in energy bills for occupants of subject buildings.	
BE-5.6	Structural Change, Funding	Provide a rebate at time of sale for qualifying building electrification upgrades including panels, wiring, and heat pump appliances. Implement the rebate program by 2025.	
BE-5.7	Education, Structural Change	Improve the City's building electrification permit process through a comprehensive permitting compliance program that streamlines processes, reduces fees, provides permit and inspection checklists, shortens review times, and educates affected trades and staff, thus	

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e) ¹
		reducing barriers to electrification and unlocking available incentives.	
BE-5.8	Feasibility Studies	Conduct a feasibility study of a smart building market demand program, such as Recurve’s <i>flexgrid</i> program. The study should include a pilot project that allows building owners to track the power generation and consumption of their retrofitted structures and work on making this a widely available and affordable option.	
BE-5.9	Structural Change	Develop the program studied in BE-5.8 that allows building owners to track the power generation and consumption of their retrofitted structures to optimize energy management.	
BE-5.10	Funding	Partner with ReCurve or similar entity to design and implement a market demand program that would pay energy users to save energy during times of peak demand, use energy more efficiently, and help balance the grid.	
BE-5.11	Education	Expand education programs directed at homeowners and renters on energy resource programs (examples include energy efficiency programs, demand response, and market demand programs).	
BE-5.12	Structural Change	Promote residential energy disclosure legislation, requiring home energy score at time of all residential property sale or rental listings.	
BE-5.13	Structural Change, Funding	Establish a program that provides targeted direct install services and cost share for specific electrification measures with multi-unit residential development owners. City to cover incremental cost in addition to an incremental electricity rate from SBCE.	
BE-5.14	Structural Change, Equity	Develop and implement a multi-family residential property regulation by 2028 to promote phased building energy efficiency and decarbonization. The regulation would require periodic energy inspections and prescriptive energy efficiency and decarbonization points requirements from a standardized checklist, with required performance increasing over time.	
BE-5.15	Structural Change	Develop an emergency hot water appliance program where the City provides residents with emergency natural gas hot water heaters within 24 hours of a request, with an agreement that the resident’s gas powered hot water heater will be replaced within 6 months with a heat pump water heater.	
BE-5.16	Education	Increase community awareness and understanding of tax benefits for residential building energy efficiency upgrades (Example: the Residential Energy Efficiency Property Tax Credit).	
BE-5.17	Funding	Develop incentives for California Alternate Rates for Energy (CARE)/ Family Electric Rate Assistance (FERA) subsidized rate programs for low-income resident customers to increase energy assurance.	
BE-5.18	Structural Change, Funding	Implement direct installation and/or incentive programs that facilitate the installation of combined solar and battery energy storage system installations on local area single family residential buildings. Target 120 installations by 2035.	
BE-5.19	Moonshot	Adopt a natural gas end of flow date by 2040. ¹ Create public engagement and education campaigns around this action to give the community advanced notice as well as signify all progress being made to make this possible.	

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e) ¹
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¹ Action BE 5.1 is quantified separately from the other actions as quantification is based on the adoption of a specific ordinance. As described in detail *Section Action BE-5.2 through BE-5.18*, GHG emissions reduction anticipated from Actions BE-5.2 through Action BE-5.18 are quantified together as the combination of programs, incentives, and actions will work together to generate a reduction in emissions from voluntary behavior changes.

Measure BE-5 employs a variety of policies, programs, incentives, and requirements to facilitate the transition away from natural gas to electricity in Santa Barbara’s residential building stock. GHG emissions reductions stem from two primary strategies. The first is through an electrification requirement at time of renovation (BE-5.1) and the second is through the combination of incentives and other programs that will support the voluntary transition to electric appliances. In addition, the City will develop an existing building residential electrification plan (BE-5.2) which will determine the feasibility for additional electrification requirements and specify any additional programs needed to meet the City’s long term decarbonization goals. Developing solutions for potential equity impacts is key to successful implementation when considering the comparably higher capital cost of existing building electrification. (Action BE-5.2, BE-5.5, BE-5.6, BE-5.13, BE-5.17).⁹ The residential building electrification plan is designed to give special consideration to the potential equity impacts of an electrification ordinance by investigating up-front and on-bill costs of electrification to residents, potential impacts to renters, potential impacts to electrical grid resiliency, and by specifically targeting equity groups for feedback on a residential building electrification strategy development.

In general, electrification has been found to reduce costs for homeowners over the lifetime of appliances when compared to propane or natural gas-fueled equipment, especially when retrofits are bundled and completed when appliances are already planned for replacement, or when coupled with rooftop solar installation.¹⁰ However, the City anticipates that the residential building electrification ordinance will result in up-front retrofit costs for residents that may be difficult for the community, particularly low-income residents, to bear. The largest barrier to existing building electrification is higher up-front capital costs compared to natural gas.¹¹ On-bill or financed incentives to offset these costs for the end-user are therefore among the most promising opportunities for electrification.¹² Once up-front costs are financed, long-term savings can be used to achieve cash flow positive retrofits and/or acceptable return on investment. Demonstrating cost-effective pathways for existing building electrification and equity will be a key step before mandatory requirements can be set (Action BE-5.1). Action BE-5.2, BE-5.3, BE-5.5, BE-5.6, BE-5.13, and BE-5.17 commits the City to determining the equity needs and to provide funding to meet those needs, two prominent barriers to electrification. Additional funding opportunities are identified through BE-5.10, and BE-5.18. Actions BE-5.11 and BE-5.16 support the measure through educating residents on the benefits of electrification, how to electrify, and existing tax benefits for electrification.

⁹ Greenlining Institute. 2019. *Equitable Building Electrification: A Framework for Powering Resilient Communities*. Accessed at: https://greenlining.org/wp-content/uploads/2019/10/Greenlining_EquitableElectrification_Report_2019_WEB.pdf

¹⁰ Rocky Mountain Institute (RMI). 2018. *The Economics of Electrifying Buildings: How Electric Space and Water Heating Supports Decarbonization of Residential Buildings*. Accessed at: <https://rmi.org/insight/the-economics-of-electrifying-buildings/>

¹¹ California Center for Sustainable Energy. 2009. *Solar Water Heating Pilot Program: Interim Evaluation Report*.

¹² Synapse Energy Economics, Inc. October 2018. *Decarbonization of Heating Energy Use in California Buildings*. <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

Action BE-5.1

Action BE-5.1 commits the City to planning for an electrification ordinance for existing residential buildings by 2025. Natural gas usage from residential buildings accounted for about 10% of GHG emissions in Santa Barbara in 2019. To address these GHG emissions, the existing residential electrification ordinance could ban natural gas line expansions and reconnections as well as require the installation of electric heating, ventilation, and air conditioning (HVAC) systems, hot water heaters, and other appliances at time of renovation starting in 2025. HVAC system and hot water heaters are targeted in the ordinance due to their large contribution to residential natural gas end-uses.¹³ Additionally, Action BE-5.5 commits the City to adopting an electrification ordinance for existing residential buildings by 2028 to be implemented through the building permit process, which bans expansion or reconnection of natural gas infrastructure.

The City recognizes that successful implementation of building electrification programs will require effective permit compliance. Permits are required for many energy efficiency improvements, including hot water heaters, insulation, HVAC systems, duct replacement, and others. However, permit evasion remains an issue in many jurisdictions, with studies finding permitted HVAC systems only accounting for 8-29% of total installations.^{14,15} City staff has indicated that this number is much lower in Santa Barbara. Strategies that have proven effective at improving permit compliance in various states and local jurisdictions include streamlining the compliance process, improving third-party enforcement, and advanced training for enforcement staff.¹⁶ Action BE-5.7 aims to re-work existing systems and implement these best practices in streamlining permitting to achieve better permit compliance and therefore, improved ordinance implementation success. Per Action BE-5.7, the City will work to streamline permitting for electrification and other energy projects at a city level.

Common community concerns include the potential for electrification to increase demands on and lower the resiliency of the electrical grid, especially given the potential for service disruptions for public safety power shutoffs (PSPS). Peak grid demand and, therefore, PSPS usually occurs in the summer on the hottest days when most buildings are running air conditioning. Hot water heaters, while used throughout the year, can use electricity during off-peak times by heating water and storing it for use at a later time, significantly avoiding contribution to peak demand in the summer. Electrifying a heat pump or other space heating appliance has the added benefit of being highly efficient and widespread electrification of temperature control appliances would likely reduce electricity demand throughout the year.¹⁷ The electric grid is, therefore, well-suited for absorbing increased electrical demands from building electrification, which, even under full electrification scenarios, would not exceed current peak summer electricity demands.¹⁸

¹³ Energy and Environmental Economics (E3). April 2019. Residential Building Electrification in California: Consumer economics, greenhouse gases and grid impacts. Accessed at: https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf

¹⁴ Emily Alvarez and Bruce Mast. BayREN Codes & Standards Program. October 2021. Local Government Policy Calculator for Existing Single-Family Buildings – User Guide. Accessed at: https://www.bayrencodes.org/wp-content/uploads/2021/11/BayREN-Policy-Calculator-User-Guide_10.29.2021.pdf

¹⁵ California Public Utilities Commission (CPUC). September 2017. Final Report: 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volume I – Report. Accessed at: https://www.calmac.org/publications/HVAC_WO6_FINAL_REPORT_Volumel_22Sept2017.pdfhttp://www.calmac.org/publications/HVAC_WO6_FINAL_REPORT_Volumel_22Sept2017.pdf

¹⁶ Ryan Meres et al. American Council for an Energy-Efficient Economy (ACEEE). 2012. Successful Strategies for Improving Compliance with Building Energy Codes. Accessed at: <https://www.aceee.org/files/proceedings/2012/data/papers/0193-000112.pdf>

¹⁷ Pacific Gas & Electric. 2021. Electrification for your home or building. Accessed at: https://www.pge.com/en_US/residential/customer-service/home-services/renovating-and-building/benefits-of-electric-homes-and-buildings/benefits-of-electric-homes-and-buildings.page?

¹⁸ Reem Rayef. National Resources Defense Council. April 2020. California's Grid is Ready for All-Electric Buildings. Accessed at: <https://www.nrdc.org/experts/merrian-borgeson/californias-grid-ready-all-electric-buildings>

The methods and assumptions used to calculate the GHG emissions reductions associated with Action BE-5.1 are explained further here and shown in Table 6 below. The City will start with voluntary actions and move towards an electrification at time of renovation ordinance¹⁹ by 2025 depending on progress made towards 2030 and 2035 targets. Based on studies conducted by the Harvard Joint Center for Housing Studies (JCHS) using data from the US Department of Housing and Urban Development (HUD), approximately 25 percent of existing homes in 2021 in the Los Angeles metro area conducted renovations.²⁰ Of the renovation projects, approximately 2 percent and 9 percent of the projects included water heater and HVAC replacements, respectively. This equates to an estimated replacement of water heaters and HVAC units at a 0.4 percent and 2.3 percent annual rate, respectively, due to renovation. For the purposes of this calculation, it was assumed that trends in the City of Santa Barbara are similar to those of the Los Angeles metro area. GHG emissions were quantified by multiplying the annual percent of unit replacement by the number of years since implementation of the ordinance multiplied by the estimated contribution to total natural gas consumption in residences from the unit (e.g., water heater, HVAC). The calculation also assumes that 10% of all appliances being replaced would adhere to the requirement established through Action BE-5.1. This percentage of compliance is based on the CPUC study on HVAC and code compliance and further substantiated by the City staff that have found low permit compliance due to cost and complexity of permitting process.¹⁵

While the replace at time-of-renovation does help the City achieve the 2030 target, it does not guarantee the City will meet its goal of carbon neutrality by 2035. Achievement of complete building sector decarbonization will depend on the success of the education, funding, and technical assistance the City will provide. As the City will be tracking compliance, future CAP updates may need to outline new actions to close any remaining gaps. Santa Barbara’s energy portfolio with carbon-free electricity supports these reductions and is captured in the calculations. Also, it is important to clarify that Action BE-5.19 which looks to adopt a natural gas end of flow date by 2040 was not included in the quantification of emission reductions. This is a City’s moonshot action, and more information and community engagement will be needed for the City to determine how that may occur.

Table 6 GHG Emissions Reductions from Action BE-5.1

Inputs and Assumptions	
Ordinance implementation year	2025
Natural gas emissions factor (MT CO ₂ e/therm) ¹	0.00531
Methane Leakage (% of NG delivered) ²	2.8%
Methane Leakage EF (MT CO ₂ e/therm) ³	0.05307
Conversion Factor (kWh/therm) ⁴	29.3
Average increased efficiency of electric appliances over natural gas appliances (%) ⁴	300%
Residences undergoing renovation annually ⁵	25%
Renovations including water heater replacement ⁵	2%
Renovations including HVAC replacement ⁵	9%
Natural gas usage that comes from water heater ⁶	38%
Natural gas usage that comes from space heating/cooling ⁶	39%

¹⁹ This type of ordinance is triggered by the replacement or upgrade of a natural gas system during renovation of the building.

²⁰ Joint Center for Housing Studies of Harvard University. 2023. Improving America’s Housing 2023. <https://www.jchs.harvard.edu/sites/default/files/reports/files/JCHS-Improving-Americas-Housing-2023-Report.pdf>

Assumed compliance⁷

10%

GHG Emissions Reductions Calculations	2030	2035
Annual existing building natural gas usage (therms) ⁸	12,350,115	12,350,115
Annual existing natural gas usage for water heaters (therms)	4,631,293	4,631,293
Annual existing natural gas usage for space heating (therms)	4,824,264	4,824,264
Percentage of renovated homes with replaced water heaters, assuming some 10% compliance	0.2%	0.4%
NG reduction from water heater replacement (therm)	8,928	17,855
NG reduction from space heater replacement (therm)	54,462	108,925
Percentage of renovated homes with replaced HVAC, assuming some 10% compliance	1.1%	2.3%
Total NG avoided (therms)	63,390	126,780
Combustion emissions from total NG saved (MT CO ₂ e)	337	673
Methane leakage avoided (therms)	1,775	3,550
Emissions from methane leaked avoided (MT CO ₂ e)	94	188
Electricity usage from converting to electric (kWh)	619,111	1,238,222
Weighted electricity EF (lbs CO ₂ e/MWh)	16.91	4.23
Emissions from converted electricity usage (MT CO ₂ e)	5	2
Total Residential Reductions (MT CO₂e)	426	859

Notes: MT CO₂e = metric tons of carbon dioxide; kWh = kilowatt-hour

¹ EPA's Emission Factors for Greenhouse Gas Inventories

² Based on recent studies, there is a leakage rate of approximately 2.8% of all natural gas delivered. See references from *City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum*

³ Calculated by multiplying cubic meter of natural gas per therm (2.85) [source: <https://www.abraxasenergy.com/energy-resources/toolbox/conversion-calculators/energy/>] by density of natural gas (0.000712 MT/ cubic meter) [source: <https://www.unitrove.com/engineering/tools/gas/natural-gas-density>] by methane content of natural gas (94.9%) [source: North American Energy Standards Board]. Adjusted for GWP of CH₄.

⁴ Conversion factor of 29.3001 kWh/therms and the assumption that electric appliances are generally three time more efficient than gas appliances obtained from <https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump>.

⁵ JCHS. 2023. Improving America's Housing 2023. <https://www.jchs.harvard.edu/sites/default/files/reports/files/JCHS-Improving-Americas-Housing-2023-Report.pdf>

⁶ Decarbonization of Heating Energy Use in California Buildings (figure 2, page 8) <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

⁷ Based off the percent of energy efficiency requirements for HVAC unit being met or exceeded - this gives indication of likely hood that a piece of equipment will be upgraded with a more efficiency version. In most cases an electric alternative is the more efficient version. See CPUC's Final Report: 2014-16 HVAC Permit and Code Compliance Market Assessment (Work Order 6) Volume I – Report, accessed at: http://www.calmac.org/publications/HVAC_WO6_FINAL_REPORT_VolumeI_22Sept2017.pdf

⁸ Values obtained from *City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum*

Action BE-5.2 through BE-5.18

As discussed above, the primary strategy for electrification in the near term will be through voluntary adoption supported by targeted incentives, information, programs and policies outlined by the actions under measure BE-5. The City will begin voluntary actions immediately with the CAP adoption to accelerate the electrification of existing residential buildings. It is assumed that with the programs and incentives in place developed through Measure BE-5, approximately 25% of natural gas appliances would be voluntarily replaced with electric versions at time of burnout. This would be in addition to the electrification at time of renovation ordinance (Action BE-5.1). This level of reduction is in line with the CARB 2022 State SIP which calls for an end to gas water heater and

HVAC sales by 2030.²¹ Furthermore, sales of air source heat pumps have been increasing throughout California and has reached upwards of 20% already while electric water heaters are closer to 11%.²² With the addition of the incentives and programs identified in Measure BE-5 as well as those provided through the Inflation Reduction Act which would help create upfront cost parity and will increase these adoption rates even higher. Adjustments to the program will be further refined to meet these targets based on the results of the feasibility study performed as part of Action BE-5.2. To estimate the GHG reductions associated with replacing appliances at time of burnout with an electric alternative, the expected life span of each appliance (HVAC, water heater, stove) and the estimated contribution to total natural gas consumption was modeled. References for appliance life span and contribution to overall natural gas usage are included in Table 7.

Table 7 GHG Emissions Reductions from Voluntary Actions as Part of Measure BE-5 (Actions BE 5.2 through BE 5.18)

Inputs and Assumptions	
Program Implementation year	2023
Natural gas emissions factor (MT CO ₂ e/therm) ¹	0.00531
Methane Leakage (% of NG delivered) ²	2.8%
Methane Leakage EF (MT CO ₂ e/therm)	0.05307
Conversion Factor (kWh/therm)	29.3
Average increased efficiency of electric appliances over natural gas appliances (%) ³	300%
Natural gas usage that comes from water heater ⁴	38%
Natural gas usage that comes from space heating/cooling ⁵	39%
Average natural gas water heater lifespan ⁷	13
Average natural gas HVAC lifespan ⁸	21.5
Average natural gas stove lifespan ⁹	12
Assumed voluntary implementation ¹⁰	25%

GHG Emissions Reductions Calculations	2030	2035
Building natural gas usage (therms) ¹¹	12,286,725	12,223,335
Percentage of homes with replaced water heaters, assuming voluntary electrification	13%	23%
NG reduction from water heater replacement (%)	5%	9%
Percentage of homes with replaced HVAC, assuming voluntary electrification	8%	14%
NG reduction from HVAC replacement (%)	3%	5%
Percentage of homes with replaced stoves, assuming voluntary electrification	15%	25%
NG reduction from stove replacement (%)	1%	2%
Total percent reduction of NG (%)	10%	16%
Total NG saved (therms)	1,172,164	1,999,056
Emissions from total NG saved (MT CO ₂ e)	6,226	10,618
Methane Leakage Avoided (therms)	32,821	55,974
Emissions from Methane Leaked Avoided (MT CO ₂ e)	1,742	2,970

²¹ https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf

²² <https://www.calmac.org/publications/OD-CPUC-Heat-Pump-Market-Study-Report-5-17-2022.pdf>

GHG Emissions Reductions Calculations	2030	2035
Electricity usage from converting to electric (kWh)	11,448,132	19,524,118
Weighted electricity EF (lbs CO ₂ e/MWh)	16.91	4.23
Emissions from converted electricity usage (MT CO ₂ e)	88	37
Total Residential Reductions (MT CO₂e)	7,880	13,551

¹ City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum

² City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum

³ Pacific Gas & Electric. 2021. Electrification for your home or building. Accessed at: https://www.pge.com/en_US/residential/customer-service/home-services/renovating-and-building/benefits-of-electric-homes-and-buildings/benefits-of-electric-homes-and-buildings.page?

⁴ Decarbonization of Heating Energy Use in California Buildings (figure 2, page 8) <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

⁵ Decarbonization of Heating Energy Use in California Buildings (figure 2, page 8) <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

⁶ <https://treehozz.com/how-many-ccf-of-natural-gas-does-a-home-use>

⁷ EIA. 2018. Updated Buildings Sector Appliance and Equipment Cost and Efficiencies. Appendix C. Accessed at: <https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>

⁸ EIA. 2018. Updated Buildings Sector Appliance and Equipment Cost and Efficiencies. Appendix C. Accessed at: <https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>

⁹ EIA. 2018. Updated Buildings Sector Appliance and Equipment Cost and Efficiencies. Appendix C. Accessed at: <https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>

¹⁰ Assumed percent of voluntary electrification based on market trends and impacts of supportive programs

¹¹ Natural Gas Prohibition in new buildings from Measure BE-4 and electrification at time of renovation ordinance (Action BE-5.5) accounted for in calculation.

Measure BE-6 Reduce Commercial Natural Gas Consumption 10% Below 2019 Levels by 2030 and 18% Below 2019 Levels by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
BE-6.1	Structural Change	Based on the results of measure BE-5.2, the existing building electrification feasibility analysis, develop and adopt an ordinance for existing commercial buildings by 2025, effective 2026, that requires the replacement of fossil fuel building systems such as HVAC and Domestic Hot Water systems with heat pumps at time of renovation. Any buildings that are unable to be electrified due to technological infeasibility shall be decarbonized with other technology. Adopt an electrification ordinance for existing commercial buildings by 2028, effective 2029, to be implemented through the building permit process, which bans expansion or reconnection of natural gas infrastructure.	2030: 1,174 2035: 3,158
BE-6.2	Structural Change	Develop and implement a commercial and mixed-use building benchmarking program for commercial and multifamily buildings over 20,000 square feet by 2025, effective 2026. The program would include reporting electricity and natural gas usage (and any other energy source) data through energy star portfolio manager. It would establish monetary penalties for non-compliance. Residential portions of buildings that are part of a mixed-use development would be exempt. Create incentives for buildings not covered to encourage voluntary compliance.	2030: 4,113 2035: 6,149
BE-6.3	Structural Change	Develop and implement a building performance standard by 2028. The standard should identify a GHG emissions per square footage threshold for each commercial building type using the data collected	

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
		under action BE-6.2. The program will start with larger commercial/multifamily residential buildings and decrease in size over time.	
BE-6.4	Structural Change, Feasibility Studies	Re-evaluate building performance program every 3 years to gauge implementation progress and possible expansion to smaller sized buildings.	
BE-6.6	Funding, Feasibility Studies, Partnerships, Education	<p>Expand education, outreach and engagement efforts relating to building electrification and energy resources, including these actions:</p> <ul style="list-style-type: none"> • Partner with the Santa Barbara South Coast Chamber of Commerce to inform and facilitate electrification for commercial business owners. • Conduct a survey of small businesses detailing obstacles and needed resources to inform equity considerations of the ordinance. • Conduct engagement efforts to the commercial sector to identify ways the City can support commercial energystorage installations and neighborhood scale microgrid opportunities. • Leverage the grant writer position(s) in strategy A-2.2 to facilitate funding opportunities for commercial business electrification by identifying and supporting grant opportunities, prioritizing small businesses and under-resourced communities. <p>Implement feedback provided during the community outreach process to small businesses and under-resourced population-owned businesses to address potential equity impacts of the building performance program.</p>	
BE-6.7	Structural Change	Track and require rental energy use disclosures at all commercial property over 10,000 SF. Require an ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) level-1 audit for properties over 10,000 SF, and property over 20,000 SF requires an ASHRAE level-2 audit to be conducted and disclosed to the City, tenants, and potential buyers prior to sale and/or listing.	
BE-6.8	Structural Change, Funding	Establish a decarbonization incentive rate pilot program that would charge SBCE customers a reduced marginal cost rate for installation of specific electrification measures. Target commercial kitchens/restaurants, Hotel/Motels, etc.	
BE-6.9	Education	Publicize tax breaks for commercial building energy efficiency upgrades. For example, Section 179D Deduction is a federal tax deduction that allows commercial building owners to deduct up to \$1.80 per square foot of the cost of qualifying energy-efficient upgrades made to their buildings, including HVAC systems, lighting, and building envelope improvements.	
BE-6.10	Structural Change, Funding	Implement direct installation and/or incentive programs that facilitate the installation of combined solar and battery energy storage system installations on local area commercial buildings. Target 36 installations by 2035.	
BE-6.11	Structural Change	Develop an emergency hot water appliance program where the City provides commercial residents with emergency natural gas hot water heaters within 24 hours of a request, with an agreement that the hot water heater will be replaced within 6 months with a heat pump.	

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
BE-6.12	Structural Change, Education, Equity	Create a commercial and mixed-use building electrification accelerator program to increase community access to building electrification resources. This program should include the provision and expansion of resources needed to support building electrification. For example, providing rebates, enhanced funding for income-qualified homeowners, technical expertise, and contractor support.	

Measure BE-6 supports the electrification of commercial buildings within the City of Santa Barbara through a variety of mandatory actions, incentives, policies and programs. GHG emissions reductions are achieved through two major pathways. Action BE-6.1 commits the City to developing and implementing a commercial building electrification ordinance triggered by retrofits and covers both HVAC and hot water systems. Additional reductions are achieved through a variety of policies and programs which include components such as developing and maintaining a building benchmarking program through Action BE-6.2 and Action BE-6.12 and energy use disclosure through Action BE-6.5. Existing building electrification in the commercial sector is less researched than in the residential sector. While some commercial natural gas end uses may be ripe for electrification (about 27% of commercial floor space heated with fossil fuel systems can be electrified today with a simple payback period of less than 10 years) other end uses may not.²³ However, the commercial sector accounts for a large portion of the City’s total natural gas usage (about 7% of the total City emissions), and therefore provides significant opportunity for decarbonization. Because commercial buildings are more variable than residential buildings, and their systems can be more complicated, additional data is needed to identify cost effective decarbonization strategies. The building benchmarking program will allow the City and building owners to gather more data on commercial buildings over time, perform cost saving retro-commissioning, and ultimately plan for the most cost effective decarbonization strategy. Future updates to the building strategy could identify specific GHG emissions reductions targets to allow for additional quantified GHG emissions reductions.

Technologies that currently exist for electrifying HVAC systems and water heaters in the commercial sector range from cost-effective to prohibitively expensive, usually depending on the complexity of the system.²⁴ Additionally, while all-electric HVAC systems and water heaters can be cost-effective over their lifetimes, up-front costs may be substantially higher with payback periods longer than 10 years.²⁵ Financial incentives are needed to make conversion of about 73% of commercial floor space cost effective, not to mention other end uses that are less well studied.²⁶ However, it should be noted that these costs are not specific to Santa Barbara, and additional study (through action BE-5.2) will provide more detail related to cost effectiveness. To bridge the gap between gas and electric infrastructure costs, Actions BE-6.3, BE-6.6, and BE-6-9 support Measure BE-6 by establishing pathways for funding, such as rebate and grant programs, and incentivizing

²³ Steven Nadel and Chris Perry. American Council for an Energy-Efficient Economy (ACEEE). October 2020. Electrifying Space Heating in Existing Commercial Buildings: Opportunities and Challenges. Accessed at: <https://www.aceee.org/press-release/2020/10/report-electrifying-heating-existing-commercial-buildings-could-cut-their>

²⁴ Steven Nadel and Chris Perry. American Council for an Energy-Efficient Economy (ACEEE). October 2020. Electrifying Space Heating in Existing Commercial Buildings: Opportunities and Challenges. Accessed at: <https://www.aceee.org/press-release/2020/10/report-electrifying-heating-existing-commercial-buildings-could-cut-their>

²⁵ Steven Nadel and Chris Perry. American Council for an Energy-Efficient Economy (ACEEE). October 2020. Electrifying Space Heating in Existing Commercial Buildings: Opportunities and Challenges. Accessed at: <https://www.aceee.org/press-release/2020/10/report-electrifying-heating-existing-commercial-buildings-could-cut-their>

²⁶ Steven Nadel and Chris Perry. American Council for an Energy-Efficient Economy (ACEEE). October 2020. Electrifying Space Heating in Existing Commercial Buildings: Opportunities and Challenges. Accessed at: <https://www.aceee.org/press-release/2020/10/report-electrifying-heating-existing-commercial-buildings-could-cut-their>

electrification of commercial properties by owners. Actions BE-6.11 and Action BE-6.12 establish programs to allow commercial owners a grace period to transition to electric water heaters in the case of emergencies and aim to accelerate commercial building electrification through community access to electrification resources.

Education has been shown to improve code compliance when implemented in addition to a permitting compliance program and has therefore, been identified as a key component of the electrification ordinance implementation process.²⁷ To close the knowledge gap about commercial building electrification in Santa Barbara, Actions BE-6.1, BE-6.6, BE-6.9, and BE-6.12 commits the City to engaging with the commercial sector and business community to understand barriers, equity concerns, cost impacts, and opportunities associated with electrification of commercial natural gas end uses. Outreach would include engagement with the local business community, such as the Santa Barbara South Coast Chamber of Commerce, to continuously understand the challenges of electrification and removed challenges and provide support. Action BE-6.10 commits the City to enforcing the electrification requirements on commercial buildings through the same permitting program established under Measure BE-5 (Action BE-5.7).

While electrification is not expected to result in additional strain on the electrical grid due to the efficiency of heat pumps,²⁸ commercial- scale energy assurance projects present an opportunity to improve the resilience of the electrical grid and provide cost savings over the lifetime of the equipment through battery storage.²⁹ 2022 California Building Energy Code requires new commercial construction over 5,000 square feet to install PV and storage to meet 60% of the building's energy load and reduce exports to 10%.³⁰ Action BE-6.9 commits the City to exploring opportunities to support commercial battery storage installations beyond these requirements for existing buildings.

Action BE-6.1

The methods and assumptions used to calculate the GHG emissions reductions associated with this metric are explained further here and shown in Table 8 below. The reductions gained from commercial building electrification follow a similar process as residential buildings with the development of programs to accelerate and encourage voluntary electrification of commercial businesses followed by the adoption of a time of renovation electrification ordinance by 2027. Further, by 2028 an ordinance banning reconnection to natural gas infrastructure will be adopted. Based on the market research report by IBISWorld on commercial property remodeling in the United States, the commercial building renovation market made up about 22 percent of the total commercial building market in 2022.³¹ It is anticipated that the commercial renovation market will continue to grow and make up a larger portion of the commercial building market due to the aging building stock and need for upgrades. A study by the Lawrence Berkely National Laboratory found that of the renovation and retrofit projects occurring at commercial buildings, approximately 18 percent and 20 percent of the projects included water heater and HVAC system replacements,

²⁷ Ryan Meres et al. American Council for an Energy-Efficient Economy (ACEEE). 2012. Successful Strategies for Improving Compliance with Building Energy Codes. Accessed at: <https://www.aceee.org/files/proceedings/2012/data/papers/0193-000112.pdf>

²⁸ Reem Rayef. National Resources Defense Council. April 2020. California's Grid is Ready for All-Electric Buildings. Accessed at: <https://www.nrdc.org/experts/merrian-borgeson/californias-grid-ready-all-electric-buildings>

²⁹ National Renewable Energy Laboratory (NREL). June 2021. Battery Storage for Resilience. Accessed at: <https://www.nrel.gov/docs/fy21osti/79850.pdf>

³⁰ Kelsey Misbrenner. Solar Power World. August 2021. California Energy Commission mandates solar + storage on new commercial buildings. Accessed at: <https://www.solarpowerworldonline.com/2021/08/california-energy-commission-mandates-solar-storage-new-commercial-buildings/>

³¹ IBISWorld. May 2023. Commercial Property Remodeling Industry in the US – market Research Report. Accessed at: <https://www.ibisworld.com/united-states/market-research-reports/commercial-property-remodeling-industry/>

respectively.³² This equates to an estimated replacement of water heaters and HVAC units at a 4.0 percent and 4.5 percent annual rate, respectively, due to renovation or retrofit. Similar to Measure BE-5, GHG emissions were quantified by multiplying the annual percent of unit replacement by the number of years since implementation of the ordinance, multiplied by the estimated contribution to total natural gas consumption in residences from the unit (e.g., water heater, HVAC). The calculation also assumes that 25% of all appliances being replaced would be in compliance with the requirements established through Action BE-6.1 and BE-6.2. This percentage of compliance is based on recent findings by the Natural Resources Defense Council (NRDC) that only about 25 percent of commercial HVAC replacements are permitted and undergo inspection.³³

Table 8 GHG Emissions Reductions from Action BE-6.1

Inputs and Assumptions	
Ordinance implementation year	2027
Natural gas emissions factor (MT CO ₂ e/therm) ¹	0.00531
Methane Leakage (% of NG delivered) ²	2.8%
Methane Leakage EF (MT CO ₂ e/therm) ³	0.05307
Conversion Factor (kWh/therm) ⁴	29.3
Average increased efficiency of electric appliances over natural gas appliances (%) ⁴	300%
Commercial buildings undergoing renovation annually ⁵	22%
Renovations including water heater replacement ⁶	18%
Renovations including HVAC replacement ⁶	20%
Natural gas usage that comes from water heater ⁷	28%
Natural gas usage that comes from space heating/cooling ⁷	42%
Assumed compliance ⁸	25%

GHG Emissions Reductions Calculations	2030	2035
Annual existing building natural gas usage (therms) ⁹	7,793,538	7,793,538
Annual existing natural gas usage for water heaters (therms)	2,164,872	2,164,872
Percentage of renovated homes with replaced water heaters, assuming 25% compliance	3.0%	8.1%
NG reduction from water heater replacement (therm)	65,506	174,683
Annual existing natural gas usage for space heating (therms)	3,247,307	3,247,307
Percentage of renovated homes with replaced HVAC, assuming some 10% compliance	3.4%	9.0%
NG reduction from HVAC replacement (therm)	109,177	291,138
Total NG avoided (therms)	174,683	465,821
Emissions from total NG saved (MT CO ₂ e)	928	2,474
Methane Leakage Avoided (therms)	4,891	13,043
Emissions from Methane Leaked Avoided (MT CO ₂ e)	260	692

³² Cindy Regnier P.E., Paulk Mathew Ph.D., Alastair Robinson, Jordan Shackelford, Travis, Walter Ph.D. February 2020. System Retrofit Trends in Commercial Buildings: Opening Up Opportunities for Deeper Savings. Lawrence Berkeley National Laboratory. Accessed at: https://buildings.lbl.gov/sites/default/files/Regnier%20-%20Systems%20Retrofit%20Trends.docx__1.pdf

³³ Kiki Velez, Merrian Morgeson. April 2023. Poor-Quality HVAC Installs are Costing Us – A solution is within reach. NRDC. Accessed at: <https://www.nrdc.org/bio/kiki-velez/poor-quality-hvac-installs-are-costing-us-solution-within-reach>

GHG Emissions Reductions Calculations	2030	2035
Electricity usage from converting to electric (kWh)	1,706,068	4,549,515
Weighted electricity EF (lbs CO ₂ e/MWh)	16.91	4.23
Emissions from converted electricity usage (MT CO ₂ e)	13	9
Total Residential Reductions (MT CO₂e)	1,174	3,158

MT CO₂e = metric tons of carbon dioxide; kWh = kilowatt-hour

¹ EPA's Emission Factors for Greenhouse Gas Inventories

² Based on recent studies, there is a leakage rate of approximately 2.8% of all natural gas delivered. See references from *City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum*

³ Calculated by multiplying cubic meter of natural gas per therm (2.85) [source: <https://www.abraxasenergy.com/energy-resources/toolbox/conversion-calculators/energy/>] by density of natural gas (0.000712 MT/ cubic meter) [source: <https://www.unitrove.com/engineering/tools/gas/natural-gas-density>] by methane content of natural gas (94.9%) [source: North American Energy Standards Board]. Adjusted for GWP of CH₄.

⁴ Conversion factor of 29.3001 kWh/therms and the assumption that electric appliances are generally three time more efficient than gas appliances obtained from <https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump->.

⁵ IBISWorld. May 2023. Commercial Property Remodeling Industry in the US – market Research Report. Accessed at: <https://www.ibisworld.com/united-states/market-research-reports/commercial-property-remodeling-industry/>

⁶ Cindy Regnier P.E., Paulk Mathew Ph.D., Alastair Robinson, Jordan Shackelford, Travis, Walter Ph.D. February 2020. System Retrofit Trends in Commercial Buildings: Opening Up Opportunities for Deeper Savings. Lawrence Berkeley National Laboratory. Accessed at: https://buildings.lbl.gov/sites/default/files/Regnier%20-%20Systems%20Retrofit%20Trends.docx__1.pdf

⁷ Decarbonization of Heating Energy Use in California Buildings (figure 2, page 8) <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

⁸ Kiki Velez, Merrian Morgeson. April 2023. Poor-Quality HVAC Installs are Costing Us – A solution is within reach. NRDC. Accessed at: <https://www.nrdc.org/bio/kiki-velez/poor-quality-hvac-installs-are-costing-us-solution-within-reach>

⁹ Values obtained from *City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum*

Action BE-6.2 through BE-6.12

In addition to the reductions associated with the electrification at time of retrofit program identified under BE-6.1, the City has also identified a suite of actions to promote voluntary electrification of gas appliances at time of replacement. To estimate the GHG reductions associated with replacing appliances at time of burnout with an electric alternative, the expected life span of each appliance (HVAC, water heater) and the estimated contribution to total natural gas consumption was modeled. References for appliance life span and contribution to overall natural gas usage are included in Table 9. It is assumed that with the programs and incentives in place, approximately 25% of appliances replaced at burnout would be electrified. This level of reduction is in line with the CARB 2022 State SIP which calls for an end to gas water heater and HVAC sales by 2030.³⁴ While market penetration of heat pumps in commercial buildings specifically in California is less well understood, market trends show an overall increase in heat pump installations.³⁵ Furthermore, the City has the option to leverage the building performance standard to require additional GHG emission reductions based on performance of the voluntary programs. Quantification of actions BE-6.2 through BE-6.12 are shown below in Table 9.

³⁴ https://www2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf

³⁵ <https://www.pmmag.com/articles/104065-heat-pump-water-heaters-poised-for-growth-in-commercial-markets>

Table 9 GHG Emissions Reductions from Voluntary Actions as Part of Measure BE-6

Inputs and Assumptions		
Program implementation year	2023	
Natural gas emissions factor (MT CO ₂ e/therm) ¹	0.00531	
Methane leakage (% of NG delivered) ²	2.8%	
Methane leakage EF (MT CO ₂ e/therm)	0.05307	
Conversion factor (kWh/therm)	29.3	
Natural gas usage that comes from water heater ³	28%	
Natural gas usage that comes from space heating/cooling ⁴	42%	
Average natural gas water heater lifespan ⁵	10	
Average natural gas HVAC lifespan ⁶	23	
Assumed voluntary implementation ⁷	25%	

GHG Emissions Reductions Calculations	2030	2035
Commercial NG usage after new building electrification ordinance is implemented (therms)	7,618,855	7,327,717
Percentage of buildings with replaced water heaters, assuming some non-compliance	18%	25%
NG reduction from water heater replacement (%)	5%	7%
Percentage of commercial buildings with replaced HVAC, assuming some non-compliance	8%	13%
NG reduction from HVAC replacement (%)	3%	5%
Total percent reduction of NG (%)	8%	12%
Total NG saved (therms)	611,901	907,115
Emissions from total NG saved (MT CO ₂ e)	3,250	4,818
Methane leakage avoided (therms)	17,133	25,399
Emissions from methane leaked (MT CO ₂ e)	909	1,348
Electricity usage from converting to electric (kWh)	5,976,231	8,859,487
Weighted electricity EF (lbs CO ₂ e/MWh)	16.91	4.23
Emissions from converted electricity usage (MT CO ₂ e)	46	17
Total Commercial Emission Reductions (MT CO₂e)⁸	4,113	6,149

¹ City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum

² City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum

³ Decarbonization of Heating Energy Use in California Buildings (figure 2, page 8) <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

⁴ Decarbonization of Heating Energy Use in California Buildings (figure 2, page 8) <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

⁵ EIA. 2018. Updated Buildings Sector Appliance and Equipment Cost and Efficiencies. Appendix C. Accessed at: <https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>

⁶ EIA. 2018. Updated Buildings Sector Appliance and Equipment Cost and Efficiencies. Appendix C. Accessed at: <https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>

⁷ Assumed percent of voluntary electrification

⁸ See Calculations for Measure BE-1

Measure BE-7 Increase the Impact of Santa Barbara Clean Energy (SBCE)

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO2e)
BE-7.1	Foundational	Adopt a reach code requiring all non-residential new construction and major remodels to include solar PV.	Supportive
BE-7.2	Structural Change, Education	Convert SCE direct access customers to SBCE through targeted programs, incentives, and engagement. Direct access customers purchase electricity from a competitive provider called an Electric Service Provider (ESP), instead of from a regulated electric utility like Southern California Edison (SCE).	Supportive
BE-7.3	Structural Change	Develop targeted rate structures and other incentives for large commercial customers including demand response.	Supportive
BE-7.4	Education, Equity	Develop a local education program detailing incentives for electrification and promoting the benefits of opting in to SBCE's service, particularly for under-resourced populations.	Supportive
BE-7.5	Education, Foundational	Maintain SBCE opt-out rates below 5%.	Supportive
BE-7.6	Structural Change, Foundational	Create innovative pilots for SBCE through local partnerships addressing technical, low-income, market, and policy barriers to progress the City's sustainability and resilience goals. Consider working with departments at UCSB like Technology and Management Program for innovative solutions that leverage technology, Engineering for data driven solutions, and Environmental Science for cutting edge environmental research.	Supportive
BE-7.7	Structural Change	Develop a Feed-In Tariff to increase and incentivize distributed energy resources. Feed-In Tariffs allow eligible small-scale renewable energy generating sources to sell their energy back to the utility or major energy grid.	Supportive

For Santa Barbara to reach its 2030 reduction target and 2035 carbon-neutrality target, energy utilized in the City will need to be carbon-free. Renewable electricity procurement by SBCE is essential for decarbonizing the City's emissions from electricity and creates the foundation for a carbon-free future. Decarbonizing electricity works hand-in-hand with building electrification and EVs to achieve carbon neutrality in both the building and transportation sectors. The actions associated with increasing SBCE's impact are supportive in nature because GHG emissions reductions have already been quantified in the emissions forecast. These actions work to support additional reductions and support a resilient and carbon-free power supply. Action BE-7.1 will ensure that all new non-residential development is equipped to generate its own renewable energy. BE-7.2, BE-7.3, and BE 7.5 work towards maintaining low SBCE opt-out rates to maximize the renewable energy provided by SBCE. BE-7.4 works together with other educational actions in the building sector to assist residents and businesses in taking necessary steps towards electrification. BE-7.6 ensures that the City stays up-to-date with cutting edge technology to improve electrification as the field evolves. BE-7.7 incentivizes small-scale renewable energy generation by developing a market for selling energy and supplementing the grid. As these actions are developed and implemented, it is assumed that tracking their effectiveness will be available and therefore, quantifying their associated GHG reduction will be feasible.

3 Transportation Measures

The City has many existing programs to support all modes of transportation in Santa Barbara. In order to meet its carbon neutrality target, the City must further reduce transportation emissions as passenger vehicles accounted for 41% of GHG emissions in Santa Barbara in 2019. Reducing these emissions is complicated as it requires reducing each individual's number of miles driven by fossil fuel-powered vehicles.

The City's transportation strategy consists of a multi-pronged approach for incentivizing alternatives to fossil fuel-powered vehicle trips, including shifting transportation mode share to active transportation and public transit options, electrifying passenger and commercial vehicle trips, and decarbonizing off-road equipment.³⁶ This CAP prioritizes reducing vehicle miles travelled (VMT) by improving active and public transportation mode share, supporting regional programs that reduce the use of single occupancy vehicles, and shifting the remaining VMT to Zero Emission Vehicles. While, in theory, 100% electrification of all vehicles in Santa Barbara could achieve zero-emissions in the transportation sector without reducing VMT, the City recognizes that cars and roadways carry huge amounts of embodied emissions (emissions associated with the construction of cars and roads) that are not accounted for in the inventory.^{37, 38}

Reducing VMT carries additional potential benefits outside of GHG emissions reductions as well, including reduced congestion, reduced space needed for roadways and parking, local economic revitalization, and lifestyle improvements.³⁹ Based on this strategy, the CAP's transportation measures are shown in Table 10 below.

³⁶ Mode share in this context is used to refer to percentage of passenger trips that can be attributed to one transportation mode or another. For example, 5% active transit mode share means that 5% of all passenger trips are taken using active transit modes (walking, biking, scootering, etc.). Importantly, mode share does not refer to percentage of passenger VMT that can be attributed to a specific transportation mode, since not all trips are the same length. To convert from mode share to percent of VMT, some assumption about the length of trip in each type of mode must be applied.

³⁷ Mark Mills. August 2021. The tough calculus of emissions and the future of EVs. Accessed at: <https://techcrunch.com/2021/08/22/the-tough-calculus-of-emissions-and-the-future-of-evs/>

³⁸ Embodied emissions are associated with energy used in the extraction, processing, and transportation of materials.

³⁹ Richard Campbell and Margaret Wittgens. March 2004. The Business Case for Active Transportation. Accessed at: http://thirdwavecycling.com/pdfs/at_business_case.pdf

Table 10 Transportation Measures

Measure Number	GHG Emissions Reduction Measures	Anticipated Reduction/ Sequestration (MT CO ₂ e)
T-1 (Municipal)	Continue to develop and implement the municipal Transportation Demand Management (TDM) program	Supportive
T-2 (Municipal)	Electrify or otherwise decarbonize the municipal fleet by 2035	Supportive
T-3	Implement programs that enhance access to safe active transportation, such as walking and biking, to increase active transportation mode share to 6% by 2030 and to 10% by 2035	2030: 952 2035: 2,757
T-4	Implement programs to encourage public transportation to increase public transportation mode share to 7% by 2030 and to 8% by 2035.	2030: 3,547 2035: 4,641
T-5	Support and promote regional programs that reduce the use of single occupancy vehicles	Supportive
T-6	Increase zero-emission passenger vehicle use and adoption to 30% by 2030 and 55% by 2035	2030: 53,948 2035: 107,774
T-7	Accelerate zero-emission commercial vehicle use and adoption to 26% by 2030 and 45% by 2035	2030: 1,777 2035: 2,140
T-8	Electrify or otherwise decarbonize 6% of off-road equipment by 2030 and 20% by 2035	2030: 2,857 2035: 9,859

These Measures and associated actions will build off existing City programs to provide incentivized options and infrastructure to increase active transportation, public transportation, Zero Emission Vehicle (ZEV) use and reduce the use of single occupancy vehicles. Measure T-3 aims to achieve greater mode-shifts to active transportation as well as low-stress and convenient infrastructure. To increase safe access to bicycle and pedestrian facilities, infrastructure improvements are needed in order to remove existing barriers to active transportation. With safer, more accessible active transportation opportunities, more people will choose active transportation modes.⁴⁰

To achieve greater reliability in public transit (Measure T-4), MTD and the City will continue to develop and improve public transit programs and services. This measure prioritizes shared and public transit in the city, makes transit more convenient, and reduces the time it takes to reach a destination via transit—important determining factors for shared and public transit mode share. Measure T-5 provides the supportive framework for the goals in Measures T-3 and T-4 by creating programs and policies that both incentivize use of the active transportation and transit network, while also disincentivizing driving a single-occupancy vehicle, such as limited parking options. Reduction in single-occupancy vehicle VMT is largely based on behavior change which can be influenced with a combination of infrastructure that provides the alternative network to use and incentives/disincentives to single-occupancy vehicles. While the City cannot require its residents or businesses to buy ZEVs, Measures T-6 and T-7 will ensure that the ZEV infrastructure and incentives are available throughout the City to continue to remove barriers to passenger and commercial ZEV adoption. Lastly, Measure T-8 directs City efforts and activity in decarbonizing off-road equipment.⁴¹

⁴⁰ Smith, M., Hosking, J., Woodward, A. et al. Systematic literature review of built environment effects on physical activity and active transport – an update and new findings on health equity. *Int J Behav Nutr Phys Act* 14, 158 (2017). <https://doi.org/10.1186/s12966-017-0613-9>

⁴¹ Off road equipment includes vehicles and equipment that operates not on traditional roadways https://ww2.arb.ca.gov/sites/default/files/offroadzone/pdfs/offroad_booklet.pdf

Measure T-1 (Municipal) Continue to Develop and Implement the Municipal Transportation Demand Management (TDM) Program

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-1.1	Structural Change, Foundational, Funding	Provide free or discounted access to public transit passes and the electric bicycle share program for all municipal employees and expand the WorkTRIP program to offer additional carbon-free or carbon-reduced modes of travel incentives.	Supportive
T-1.2	Structural Change	Develop a hybrid remote work program policy that supports municipal office employees to work from home as feasible (including alternative work schedules where feasible). City to provide financial assistance to help offset costs associated with home office needs.	Supportive
T-1.3	Structural Change, Funding	Provide cash incentives or paid time off for City employees to bike, walk, and carpool to work.	Supportive
T-1.4	Feasibility Studies	Conduct a detailed survey of City staff commute data annually including employee feedback to identify both major emission sources and potential gaps in planning.	Supportive
T-1.5	Feasibility Study, Structural Change	Identify opportunities for accessing bike lockers and showers at municipal office buildings.	Supportive

All actions of Measure T-1 work together to reduce the emissions associated with City staff commutes. Action T-1.2 allows for staff to work from home and eliminate commuter emissions on those days. Actions T-1.1 and T-1.3 provides incentives to carpool, use transit, or use alternative transportation when commuting and Actions T-1.4 and T-1.5 addresses challenges associated with these modes of transportation. The development and implementation of a successful TDM program will act as a case-study for other agencies, organizations, and businesses in the city to learn from and implement accordingly. This measure is not quantified to avoid double counting. Municipal emissions are a subset of community emissions and are already quantified under the community actions.

Measure T-2 (Municipal) Electrify or Otherwise Decarbonize the Municipal Fleet by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-2.1	Foundational	Complete and implement the City's Zero Emission Vehicle Acquisition Policy to convert fossil fuel municipal fleet vehicles, where feasible, to electric or otherwise decarbonize the fleet by 2035, including a short and long-term schedule for completion as well as potential for regional bulk procurement. Gain approval from City Council to allow discretionary electric vehicle purchases from different vendors.	Supportive
T-2.2	Structural Change	Install additional zero emission vehicle chargers in municipal parking lots for fleet and employee use.	Supportive
T-2.3	Foundational, Feasibility Studies	Procure biofuels (renewable diesel and biogas) to operate municipally owned on and off-road equipment with no existing opportunities for decarbonization. Re-evaluate decarbonization opportunities regularly to ensure biofuels are not being used for equipment that could otherwise be decarbonized.	Supportive
T-2.4	Structural Change	Develop and adopt a purchasing policy for smaller equipment (e.g., landscaping equipment) that includes reviews and prioritization of emissions-free equipment each time equipment is purchased.	Supportive

Actions in Measure T-2 build from existing work the City has done doing to reduce emissions associated with electrification and decarbonization of the municipal fleet. Action T-2.1 will implement the City's existing zero-emission vehicle first purchasing policy for all municipal vehicles and Action T-2.4 will adopt a new policy for smaller equipment. Actions T-2.2 and Actions T-2.3 involves the provision of additional infrastructure and resources to support electric and biofuel vehicles. Municipal emissions are a subset of community emissions and are already quantified under the community actions.

Measure T-3 Implement Programs that Enhance Access to Safe Active Transportation, such as Walking and Biking, to Increase Active Transportation Mode Share to 6% by 2030 and to 10% by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-3.1	Foundational, Funding	Implement the City's Bicycle Master Plan and Pedestrian Master Plan goals and policies to enhance community access to safe active transportation options. Using these guiding documents, identify, design and procure funding for projects that can forward the goals of the BMP and PMP, and create bike and pedestrian infrastructure that is safer, easier to use, and widely accessible for all community members.	2030: 952 2035: 2,757
T-3.2	Foundational, Funding	Pursue funding and coordinate with existing streets maintenance programs to close gaps in the pedestrian and bike network, as identified in the Bicycle Master Plan, Pedestrian Master Plan, and Capital Improvement Program.	Supportive
T-3.3	Feasibility Studies, Structural Change	Evaluate existing bike parking facilities and identify what improvements can be made to increase parking supply, reduce theft, and increase rider attraction. Include analysis of last mile limitations and hurdles and add bike parking near transit stops accordingly. Consider AB 2097 and expanding bike parking with private facilities when vehicle parking is limited.	Supportive

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-3.4	Structural Change, Equity	Adopt the State’s Slow Streets Program and expand the City’s existing neighborhood traffic calming efforts with a focus on equity considerations for additional locations.	Supportive
T-3.5	Partnerships, Education	Engage MOVE SBC, SBCAG, MTD, Santa Barbara County Public Health Department, Cottage Hospital, school districts, local law enforcement, bike advocates, and community stakeholders to continue to identify and implement additional short-term and long-term bikeway and pedestrian infrastructure improvements, Vision Zero messaging and efforts, and general education regarding the safe utilization of our public active infrastructure.	Supportive
T-3.6	Equity, Foundational	Build new infrastructure to ensure there is equitable access to safe bike and pedestrian infrastructure in all areas of the city. Focus planning, development, and construction of active transportation infrastructure in regionally defined disadvantaged communities.	Supportive
T-3.7	Structural Change	Evaluate amending the zoning ordinance to increase bike parking and types of bike parking facilities for land development projects.	Supportive
T-3.8	Foundational	Implement the recommended bike facilities outlined in the Santa Barbara Bicycle Master Plan to add 30 miles of bike ways to the City by 2030.	
T-3.9	Foundational, Equity	Implement Santa Barbara's Vision Zero Strategy to eliminate serious injuries and fatalities on City streets.	Supportive
T-3.10	Feasibility Studies	Leverage technology to track mode shifts to active transportation. Conduct an annual review of progress on implementation progress, data quality, and potential barriers to implementation. Once an effective tracking method is developed, the City shall aim to achieve 6% increase in active transportation mode share by 2030 and 10% by 2035.	Supportive
T-3.11	Structural Change, Equity	Increase bike parking in nonresidential places like populated areas, City Parks, beaches, etc.	Supportive
T-3.12	Structural Change	Accelerate the production and availability of affordable housing near urban centers by updating and adopting the Housing Element and Zoning Code to reduce VMTs; by exploring alternative strategies to create and preserve affordable housing, such as co-ops, housing or land trusts; and by streamlining project review with objective design standards.	Supportive

Santa Barbara is ranked 3rd in the nation for the percentage of bicycle commute trips for cities of its size (65,000 to 100,000 people), and 8th overall.⁴² A complete description of the goals, strategy, policy, and implementation framework for expanding and improving Santa Barbara’s bikeway network is included in the Bicycle Master Plan (BMP) that was adopted in 2016. The BMP will continue to be updated as needed to identify new projects for implementation, and to ensure that improvement projects are correctly prioritized and meet the plan’s guiding principles. The most recent update occurred in 2022.

The overall goal of the City's BMP is to provide a long-term vision for improving the active transportation network in Santa Barbara and enhance connections to residential areas, transit facilities, employment, retail and commercial centers, and public facilities. The community-driven

⁴² 2016 Bicycle Master Plan – Chapter 1: Introduction
<https://santabarbaraca.gov/sites/default/files/documents/Public%20Works/Bicycle%20Master%20Plan/2016%20Bicycle%20Master%20Plan%20-%20Introduction.pdf>

2016 BMP identified bikeway projects to help create a continuous bicycle network and enhance safety with a goal to increase commuting bicycle mode share by 6.9% by 2025 compared with 2016 bicycle mode share.⁴³ These projects were prioritized across three phases with milestone implementation years of 2020, 2025, and 2030. Implementing the BMP will consist of coordinating City departments with stakeholders (e.g., MOVE SBC, and underserved communities) to accomplish bikeway projects. The 2016 BMP documented 61 miles of bicycle routes. As of 2019, there were approximately 76 miles of bicycle routes in the city. As of the most recent BMP update in 2022, there were 84.6 miles of bike ways in the city and the overall goal of the BMP is to add an additional 30 miles by 2030, for which the City is on track to accomplish.⁴⁴

Improving active transportation networks is an important part of building complete streets, which are streets that accommodate bikes, cars, shared transit, and pedestrians in an accessible way. Santa Barbara's Bicycle Master Plan and Pedestrian Master Plan implements the City's Complete Streets Policy.⁴⁵ Nationally, 48% of all vehicle trips were three miles or less in 2019, a distance easily travelled by foot, bicycle, or other micro mobility platforms.⁴⁶ An improved and expanded pedestrian network is the most effective and direct approach for shifting those shorter vehicle trips to walking, and studies show that distance to destinations is one of the strongest predictors of walking as a mode choice. However, little research has been conducted to determine quantitatively how improving the pedestrian network (rather than shortening the distance) translates to increased pedestrian mode share. This is further complicated by the fact that while improved pedestrian networks almost always have a positive correlation with increased walking, that does not always translate to decreased VMT. In other words, increased walking does not mean that walking trips are replacing driving trips. Therefore, while Santa Barbara will implement many projects to increase its active transportation network, the mode shift associated with this was estimated more conservatively and does not include reductions associated with increased walking. Lastly, the actions included in Measure T-5, which support and promote regional programs that reduce the use of the single occupancy vehicles, will also work to support Measure T-3 by encouraging programs that enhance the need for safe active transportation.

In order to estimate the mode shift potential associated with Measure T-3, other cities with similar buildouts (bike network mileage versus city land square footage) were compared. Results from significant investment in bicycle infrastructure in California suggest that bicycle mode share can be increased on par with leading bicycle cities in the state. The City of Davis leads the state with a 20% bicycle mode share⁴⁷ and 9.2 miles of bike lane per square mile of the city.⁴⁸ City of Berkeley has a 9.7% bicycle mode⁴⁹ with approximately 4.8 miles of bike land per square mile of the city.⁵⁰ Santa Barbara's bicycle mode share in 2019 was 3.9% according to Census data⁵¹ and had 3.6 miles of bike

⁴³ <https://santabarbaraca.gov/government/departments/public-works/public-works-downtown-team/transportation-policy#:~:text=The%20community%2Ddriven%20Santa%20Barbara,the%20City%20of%20Santa%20Barbara.>

⁴⁴ Communications with Samuel Furtner, City of Santa Barbara Mobility Coordinator and Associate Transportation Planner via email on June 8, 2023.

⁴⁵ 2016 Bicycle Master Plan – Goal 3: Complete Streets & Multi-modal Access.

<https://santabarbaraca.gov/sites/default/files/documents/Public%20Works/Bicycle%20Master%20Plan/2016%20Bicycle%20Master%20Plan%20-%20Goal%203%3A%20Complete%20Streets%20%26%20Multi-modal%20Access.pdf>

⁴⁶ <https://inrix.com/blog/2019/09/managing-micromobility-to-success/>

⁴⁷ <https://www.theguardian.com/cities/2015/aug/03/davis-california-the-american-city-which-fell-in-love-with-the-bicycle>

⁴⁸ <https://www.cityofdavis.org/city-hall/public-works-engineering-and-transportation/bike-pedestrian-program/davis-bike-and-pedestrian-infrastructure#:~:text=4%20miles%20of%20buffered%20bike,and%20twenty%20Done%20underpass%20crossings.>

⁴⁹ City of Berkeley. May 2017. City of Berkeley Bicycle Plan. Accessed at:

https://www.cityofberkeley.info/uploadedFiles/Public_Works/Level_3_-_Transportation/Berkeley-Bicycle-Plan-2017-Executive%20Summary.pdf

⁵⁰ <https://www.visitberkeley.com/media-press/press-kit/fact-sheet/>

⁵¹ 5-year estimate of bicycle mode share in 2019 according to census data obtained from:

<https://data.census.gov/table?t=Commuting&g=160XX00US0669070&tid=ACSST1Y2019.S0801>

lane per square mile of the city.^{52,53} With the City on track to add an additional 30 miles of bike lane by 2030⁵⁴ there would be approximately 5.4 miles of bike lane per square mile of city. Based on other similar cities it would seem that this increase in bicycle lane miles would lead to a bicycle mode share of approximately 10%. However, Census data has shown that bicycle mode share in the city has been slowly decreasing over time despite an increase in bicycle lanes, with 2021 Census data showing a 2.9% bicycle mode share.⁵⁵ This may be due in part to commuting characteristics of the community and spread out structure of the city compared with Berkely and Davis that are significantly more condensed. As Measure T-3 includes programs and policies to not just increase the quantity of bicycle lanes, but also the quality and safety of bicycle infrastructure and include programs to enhance affordable housing and equitable access to bicycle infrastructure, it is anticipated that there will be an increase in bicycle mode shift compared with current levels. As such, to remain conservative Measure T-3 sets a goal of increasing bicycle mode share to 6% by 2030 and 10 % by 2035.

The methods and assumptions used to calculate the GHG emissions reductions associated with these actions are shown in Table 11 below. EMFAC data for Santa Barbara County was utilized to determine the average trips per vehicle mile traveled and this is the best available data for the City. This factor was then used to convert City passenger VMT to the number of trips. The number of trips was multiplied by the bicycle mode share percentage to determine the number of trips that would be substituted by bicycle travel rather than passenger vehicle with the implementation of Measure T-3. It was assumed the average bike trip length was 1.5 miles⁵⁶ and therefore for every vehicle trip replaced by bicycle trip, 1.5 vehicle miles traveled would be reduced. Emission reductions were calculated by multiplying the replaced VMT by the emission factor for internal combustion engine passenger vehicles in the target year obtained from EMFAC.

⁵² Based on information from the City of Santa Barbara Mobility Coordinator and Associate Transportation Planner, there was 76 miles of bike lanes completed in the city in 2019.

⁵³ City of Santa Barbara includes 21 square miles of land obtained from: <https://santabarbaraca.gov/getting-around/maps-santa-barbara/area-city-explained#:~:text=The%20total%20area%20of%20the,total%20of%2043.09%20square%20miles>.

⁵⁴ Communications with Samuel Furtner, City of Santa Barbara Mobility Coordinator and Associate Transportation Planner via email on June 8, 2023.

⁵⁵ <https://data.census.gov/table?t=Commuting&g=160XX00US0669070&tid=ACST5Y2021.S0801>

⁵⁶ Caltrans California Household Travel Survey (2013)/CARB Bike Path Reductions Technical Documentation (2019)

Table 11 Measure T-3 Calculations

	2030	2035
Mode share target	6%	10%
Mode share increase beyond baseline ¹	2.1%	6.1%
Passenger VMT ²	841,131,670	904,613,570
Passenger trips per mile ³	0.1261	0.1258
Estimated passenger vehicle trips	106,090,611	113,832,239
New bike trips substituted for vehicle trips ⁴	2,227,903	6,943,767
Passenger VMT reduced with bike trips (miles) ⁵	3,341,854	10,415,650
Passenger Vehicle Emission Factor (MTCO ₂ e/mile) (EMFAC) ³	0.00028494	0.00026472
Total reductions (MT CO₂e)	952	2,757

¹ Santa Barbara 5-year estimate from 2019 is at 3.9% bicycle mode share.
<https://data.census.gov/table?t=Commuting&g=1600000US0669070&tid=ACSS1Y2019.S0801>

² Values from forecast. See City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum

³ Derived from EMFAC model output for Santa Barbara County 2030 and 2035; note that EMFAC generates data at the County level, and this is the best available data for the City.

⁴ Determined by multiplying estimated passenger trips by the mode share increase beyond baseline.

⁵ Assume the average bicycle trip is 1.5 miles. Caltrans California Household Travel Survey (2013)/CARB Bike Path Reductions Technical Documentation (2019)

Providing education on the benefits of active transportation as well as technical information such as trip planning, safety best practices, incentives and other programs will help generate momentum around active transportation and support the overall strategy. The City continues to work with MOVE SBC, SBCAG, MTD, Santa Barbara County Public Health Department, Cottage Hospital, school districts, local law enforcement, bike advocates, and community stakeholders to identify and implement additional short-term and long-term bikeway and pedestrian infrastructure improvements, Vision Zero messaging and efforts, and general education regarding the safe utilization of our public active infrastructure. The additional promotional activities identified under this measure, including leveraging technology to track mode shifts in active transportation, would involve conducting an annual review of progress on implementation progress, data quality, and potential barriers to implementation.

Measure T-4 Implement Programs to Encourage Public Transportation to Increase Public Transportation Mode Share to 7% by 2030 and to 8% by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-4.1	Structural Change, Feasibility Studies	Explore alternative forms of public transit, such as micro transit and/or new electric shuttle routes, in areas with higher congestion and population densities. Micro transit is a type of on-demand, shared transportation service that typically operates with smaller vehicles, such as vans or mini-buses, and offers flexible routes and schedules.	
T-4.2	Education, Foundational	Market and publicize public transportation improvements as they are planned and implemented in a variety of methods (social media, newspaper, radio, etc.) and languages to help facilitate use and success of improvement.	
T-4.3	Partnerships, Feasibility Studies	Partner with Santa Barbara MTD to determine transit priority projects and determine best potential locations for expansion and increased service.	2030: 3,547 2035: 4,641
T-4.4	Partnerships, Foundational	Work with nonprofit and community stakeholders to enhance public transit opportunities.	
T-4.5	Equity, Foundational	Work with Santa Barbara MTD to ensure public transportation access and improvements are prioritized in low-income and high population density areas of the City.	
T-4.6	Partnerships	Work with MTD to identify and implement pilot projects and infrastructure updates to make transit safer, more consistent, and more convenient.	

In general, increases and improvements to public transportation systems reduce a city’s dependence on fossil fuels and reduce VMT. To further support a transition to shared transit, the City has identified six actions which work together to improve transit adoption. In order to estimate the mode shift potential associated with Actions T-4.1 through T-4.6, other cities with similar levels and types of public transportation investment were compared. Success in other cities suggests that significant investment in public transportation can increase public transportation mode share on par with those cities. The City of San Francisco leads the state with 26% public transportation mode share in 2017 (pre-COVID). The City of Seattle has documented significant increases in public transportation mode share to 48% in 2017 (pre-COVID). Key strategies employed by these cities include significant expansions of public transportation service lines, designated streets or lanes for bus lines to decrease headways, implementation of taxes to support transit, and reduced parking availability (Measure T-5.6). Santa Barbara is following the lead of San Francisco and Seattle by implementing Actions T-4.1, T- 4.3, T-4.4. T-4.5, and T-4.6. Most of these actions involve the City working with Santa Barbara Metropolitan Transit District (MTD), a public transit agency providing bus service in the southern portion of Santa Barbara County, California. It serves the surrounding local communities (i.e., Carpinteria, Goleta, Summerland, Isla Vista, and Montecito) which often commute to Santa Barbara for work, travel, or recreation. The City will work with MTD to determine transit priority projects and determine best potential locations for expansion and increased service, which will be prioritized in low-income and high population density areas of the City. The best ways to improve a transit system and reduce driving is to expand its geographical reach and increase the frequency and reliability of transit service. Approximately 1% increase in transit frequency saves 0.5% in VMT. Bus Rapid Transit can also yield a corridor-level VMT reduction of 1-2%.⁵⁷

⁵⁷ <https://www.smartgrowthamerica.org/app/legacy/documents/smartgrowthclimatepolicies.pdf>

Action T-4.1 involves the City exploring alternative forms of transit, such as providing micro-transit and/or new electric shuttle routes. These will be alternative means of shifting mode share to transit with the goal of increasing the convenience of transit by reducing the time it takes to reach a destination via transit as well as reducing wait times (headways) for transit. One recent study modeled automated shuttles in Santa Clara County that would result in several benefits: a decrease in gasoline-based trips, an overall increase in transit usage, and additional first- and last-mile connections to transit, proving a higher accessibility of transit, especially during night hours.⁵⁸ Many cities in California and throughout the Country have been conducting micro-transit projects for several years and the number of projects is continuing to grow.^{59, 60} Action T-4.2 directs the City to improve communication of the transportation improvements with the local community. Effective communication, especially communication that takes advantage of new and emerging technologies to accurately and easily disseminate trip planning and real-time status information, is a strong factor in helping customers decide to use transit for business or leisure trips.⁶¹ Further, improving transit access has the potential to shift trips from cars to transit, which may reduce vehicle trips, VMT, and GHG emissions, with time spent getting to a transit stop being the key indicator of transit access.⁶²

Santa Barbara's baseline public transit mode share of 3.9% was calculated from 2019 Census data.⁶³ Based on T-4.1 through T-4.6 Actions, which includes strategies similar to San Francisco (26% public transit mode share) and Seattle (48% public transit mode share), it is reasonable to assume that Santa Barbara can achieve a 4% increase in transit mode share (reaching a 7% public transit mode share) in 2030. Lastly, the actions included in Measure T-5, which support and promote regional programs that reduce the use of the single occupancy vehicles will also support Measure T-4.

The methods and assumptions used to calculate the GHG emissions reductions associated with these actions are shown in Table 12 below. To avoid double-counting of VMT reduction, passenger VMT reduced due to mode shift to bicycle trips calculated as part of Measure T-3 were subtracted from total passenger VMT in the target year. The adjusted passenger VMT was converted to trips using passenger trips per mile from EMFAC, similar to the calculations described in Measure T-3. The number of trips was multiplied by the transit mode share percentage to determine the number of trips that would be substituted by transit rather than passenger vehicle with the implementation of Measure T-4. It was assumed the average transit trip length on a bus was 3.8 miles⁶⁴ and therefore for every vehicle trip replaced by a bus trip, 3.8 vehicle miles traveled would be reduced. Emission reductions were calculated by multiplying the replaced VMT by the emission factor for internal combustion engine passenger vehicles in the target year obtained from EMFAC.

⁵⁸ Poliziani C, Hsueh G, Czerwinski D, Wenzel T, Needell Z, Laarabi H, Schweizer J, Rupi F. Micro Transit Simulation of On-Demand Shuttles Based on Transit Data for First- and Last-Mile Connection. ISPRS International Journal of Geo-Information. 2023; 12(4):177. <https://doi.org/10.3390/ijgi12040177>

⁵⁹ <https://www.apta.com/research-technical-resources/mobility-innovation-hub/microtransit/>

⁶⁰ <https://transweb.sjsu.edu/research/2249-Demand-Responsive-Transportation-Shared-Mobility>

⁶¹ <https://transitleadership.org/docs/TLS-WP-Improving-the-Customer-Experience.pdf>

⁶² https://www3.arb.ca.gov/cc/sb375/policies/transitaccess/transit_access_brief120313.pdf

⁶³ 5-year estimate obtained from: <https://data.census.gov/table?t=Commuting&g=160XX00US0669070&tid=ACST1Y2019.S0801>

⁶⁴ American Public Transportation Association. December 2018. 2018 Public Transportation Fact Book. Accessed at: <https://www.apta.com/wp-content/uploads/Resources/resources/statistics/Documents/FactBook/2018-APTA-Fact-Book.pdf>

Table 12 Measure T-4 Calculations

	2030	2035
Mode share increase from baseline	7%	8%
Mode share increase beyond baseline ¹	3.1%	4.1%
Passenger miles (VMT) ²	837,789,816	894,197,921
Passenger trips per mile ³	0.1261	0.1258
Passenger trips	105,669,109	112,521,584
New transit trips substituted for vehicle trips ⁴	3,275,742	4,613,385
VMT reduced with transit trips ⁵	12,447,821	17,530,863
Passenger emission factor ³	0.00028494	0.00026472
Emission reductions from VMT avoided (MT CO₂e)	3,547	4,641

¹ Santa Barbara 5-year estimate from 2019 is at 3.9% public transportation mode share.

<https://data.census.gov/table?t=Commuting&g=1600000US0669070&tid=ACSS1Y2019.S0801>

² Values from forecast less VMT reduced with bicycle trips calculated in Measure T-3 (Table 17). See City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum.

³ Derived from EMFAC model output for Santa Barbara County 2030 and 2035; note that EMFAC generates data at the County level, and it is assumed that this is the best available data for the City.

⁴ Determined by multiplying estimated passenger trips by the mode share increase beyond baseline.

⁵ Assume that the majority of public transit in the City is bus. The average bus trip is 3.8 miles. 2018 Public Transportation Fact Book

Measure T-5 Support and Promote Regional Programs that Reduce the Use of Single Occupancy Vehicles

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-5.1	Structural Change, Partnerships, Education, Foundational	Continue to work with SBCAG to encourage employers to develop Transportation Demand Management (TDM) Plans for their employees. TDM plans should include incentives for employees to bike, walk, carpool, or take the bus to work and should be publicized on a website.	Supportive
T-5.2	Feasibility Studies, Partnerships, Equity	To enhance the Santa Barbara community’s ability to telecommute, implement SBCAG’s Broadband Regional Study to identify areas of the City that have limited access to broadband service due to infrastructure and financial limitations.	Supportive
T-5.3	Funding, Equity	To enable telecommuting, leverage the grant writer position(s) in strategy A-2.2 to identify funding opportunities to bridge the broadband access gap in the City by helping to fund installation of infrastructure or subsidize broadband service for low-income households.	Supportive
T-5.4	Funding, Equity	Provide active and alternative transportation resources across all businesses in the city prioritizing small, women owned, and minority owned businesses regardless of Transportation Demand Management Plan (TDM) membership.	Supportive
T-5.5	Foundational	Implement AB 2097 which prohibits the City from imposing minimum parking requirements on residential and commercial development, if located with ½ mile of public transit that is consistent with AB 2097.	Supportive

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-5.6	Structural Change, Funding	In line with the General Plan, develop and implement a program to manage parking of single-occupancy vehicles. Utilize on street parking pricing for all downtown parking locations and use revenue to fund active transportation, public transportation projects, and neighborhood improvements. The program should address parking issues citywide and consider measures to prevent impacts to surrounding areas and coastal access. This analysis may include citywide use of parking permit programs and other measures.	Supportive
T-5.7	Structural Change	Develop the Pilot Bike Share Program into a permanent and dependable bike share network that provides access to key destinations throughout the City, and work with regional partners to assess potential for a regional bike share system.	Supportive
T-5.8	Education, Foundational	Coordinate with SBCAG and regional partners to update regional active transportation maps. Distribute active transportation maps and educational materials to various stakeholders. Prioritize education regarding digital mapping that is available on regularly used platforms like Google Maps.	Supportive
T-5.9	Partnerships	Partner with the tourism and business sectors of the greater Santa Barbara County region to identify pathways to increase active transportation by tourists and employees.	Supportive
T-5.10	Equity, Education	Reduce driving of single occupancy vehicles through public education and engagement. Examine equity concerns around reducing single occupancy vehicles and ensure there are adequate resources available for alternative forms of transportation.	Supportive
T-5.11	Structural Change, Feasibility Study	Explore options to address long distance commuter parking. For example, add a parking lot outside of the downtown area for long distance commuters and use mode share to bring these employees into the downtown area from the new parking lot, reducing parking congestion.	Supportive

Measure T-5 supports a transition to alternative modes of transportation besides single occupancy vehicles and therefore, is supportive of both Measure T-3 and T-4. The Actions included under Measure T-5 have been shown to be effective in changing community choices around transportation. The impacts of incentive-based policies and programs improving infrastructure for safe and convenient active transportation (Measure T-3) and transit use (Measure T-4) increase when coupled with disincentives for less favorable choices, such as making it less convenient to drive a gasoline-fueled single passenger vehicle. However, disincentive-based policies can be unpopular and place a burden on the community if not implemented carefully. Measure T-5 includes both incentives and disincentives to support the infrastructure changes and programs developed in Measure T-3 and T-4. Measure T-5 includes several actions focused on developing incentives and programs to promote active transportation (Action T-5.7, Action T-5.8, Action T-5.9), alternative transportation (Action T-5.4), and teleworking (Action T-5.2, Action T-5.3). By leveraging the grant writing position through Action T-5.3, the City will work to identify funding for telework efforts and ensure low-income and disadvantage communities also have access to telework options where possible. Under Action T-5.1, the City will work with SBCAG to encourage employers to develop and implement Transportation Demand Management (TDM) Plans that incentivize alternative modes of commute for their employees.

Reduced parking supply, when combined with other VMT reduction measures such as efficient public transit, land use policies, and urban parking pricing can reduce VMT.⁶⁵ Reduced parking supply makes driving single-passenger vehicles less attractive and can shift traveler choice to other options. Parking supply can be reduced by decreasing parking requirements for new development when near public transit (Action T-5.5) and eliminating parking spots for single-occupancy vehicles (Action T-5.6). Additionally, studies have indicated that implementing a paid parking program can lead to a 1 to 2.8 percent decrease in regional VMT.⁶⁶ However, potential VMT reduction is variable and highly dependent on the specific community design, supporting programs, and how parking limits interact with other efforts to reduce VMT such as public transit and active transportation infrastructure. Structural change actions limiting single-occupancy vehicle parking and developing a street parking price for all downtown parking (Action T-5.6) should be supported by feasibility planning and engagement efforts. Action T-5.6 will generate the additional analysis needed to better understand the scale of GHG reductions that might be achieved.

Actions T-5.10 and T-5.11 provide the engagement efforts and feasibility planning needed to make structural changes limiting single-occupancy vehicle parking and developing a street parking price for all downtown parking (Action T-5.6) successful. These actions, as well as part of Action T-5.6 are also focused on identifying equity concerns so that they may be addressed in the implementation of such programs. Measure T-5 supports Measure T-3 and Measure T-4 in reducing communitywide VMT and therefore, the GHG emission reductions are not quantified.

⁶⁵ Lee Provost. Caltrans Division of Research, Innovation and System Information. March 2018. Pricing and Parking Management to Reduce Vehicle Miles Travelled (VMT). Accessed at: <https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/preliminary-investigations/final-pricing-parking-management-to-reduce-vehicles-miles-traveled-pi-a11y.pdf>

⁶⁶ Steven Spears, Marlon G. Boarnet, Susan Handy. California Environmental Protection Agency Air Resources Board, Policy Brief. September 2014. Impact of Parking Pricing and Parking Management on Passenger Vehicle Use and Greenhouse Gas Emissions. Accessed at: https://ww2.arb.ca.gov/sites/default/files/2020/06/Impacts_of_Parking_Pricing_Based_on_a_Review_of_the_Empirical_Literature_Policy_Brief.pdf

Measure T-6 Increase Zero-Emission Passenger Vehicle Use and Adoption to 30% by 2030 and 55% by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-6.1	Structural Change	In 2025 and every 3-years thereafter, amend the Municipal Code to require increased number of electric vehicle capable charging spaces in new construction and major redevelopment for commercial, mixed-use, and multi-family development.	2030: 53,948 2035: 107,774
T-6.2	Structural Change	In 2025 and every 3-years thereafter, revisit commercial and multi-family building ordinances to be updated and require large commercial (more than 10,000 square feet) and large multi-family (more than 20 units) building owners that are providing parking to install working electric vehicle chargers in 20% of parking spaces for existing buildings when undergoing a major remodel (over 50% of building effected or an addition of over 50% of gross floor space).	Supportive
T-6.3	Foundational	Add 1,788 (by 2030) and 3,536 (by 2035) new publicly accessible electric vehicle charging stations throughout the City and at City-owned facilities to support community EV charger access.	Supportive
T-6.4	Foundational	Support private development of EV charger installations by effectively streamlining City processes, such as expediting permitting, easing onerous regulations, develop a permitting design guide.	Supportive
T-6.5	Equity, Partnerships	Identify private sector partnerships and develop affordable, zero-emission vehicle car share programs to serve affordable housing and/or multi-unit developments with a priority to target under-resourced populations.	Supportive

Measure T-7 Accelerate Zero-Emission Commercial Vehicle Use and Adoption to 26% by 2030 and 45% by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-7.1	Feasibility Studies	Develop and implement a City Zero Emission Vehicle Action Plan (ZEVAP) to identify policies to accelerate ZEV adoption community wide.	2030: 1,777 2035: 2,140
T-7.2	Funding, Education, Equity	Identify and connect commercial vehicle owners, particularly those serving under-resourced communities, to resources that can incentivize vehicle electrification. This could include local tax breaks	Supportive
T-7.3	Education, Partnerships	Provide information to the public on low-carbon fuel standards (LCSF) and how businesses can develop LCSF credits or other state and federal programs to help fund conversion of commercial fleets to zero emissions vehicles.	Supportive
T-7.4	Funding	Create a small business truck buyback program to buyback trucks from local small businesses to upgrade to electric.	Supportive
T-7.5	Moonshot	Consider establishing a licensing fee for commercial delivery vehicles operating on fossil fuels (such as Amazon and FedEx) to provide funding for new active transportation and EV charging/ZEV fueling infrastructure and discounting the fee for the proportion of electric vehicles the delivery company uses.	Supportive

Together the Actions within Measures T-6 and T-7 will encourage electric vehicle (EV) adoption within the community. The state has established a goal of putting 5 million EVs on the road by 2030.⁶⁷ However, the recent passing of executive order N-79-20 calls for 100% of passenger vehicles sold to be all electric by 2035.⁶⁸ This new executive order puts the total number of EVs on the road by 2035 at approximately 15 million.⁶⁹ Based on the current number of vehicles registered in California and a 2% growth rate per year, 15 million EVs accounts for 35% of total vehicles in 2035. Interpolating between today's EV percentage at the state level (5%) and this projected growth yields an expected EV adoption rate of 25% by 2030. As a part of this CAP, the City has established its own goal in line with this and aims to reach 30% passenger EV adoption by 2030 and 55% by 2035. As of 2020, Santa Barbara has 8,408 electric vehicles, fuel cell, and plug-in hybrid vehicles out of 116,101 vehicles currently registered, together accounting for 7% of the vehicles registered within the City.⁷⁰

The City has also adopted commercial EV adoption goals, with 26% by 2030 and 45% by 2035. This is backed by new regulations that CARB adopted in June 2020, requiring truck manufacturers to transition from diesel trucks and vans to electric zero-emission trucks beginning in 2024, and establishing a target for every new truck sold in California to be zero-emission by 2045.⁷¹ CARB recently adopted the Advanced Clean Fleets rule requiring private services, federal fleets, state and local government fleets to begin their transition toward zero emission vehicles starting in 2024 with the goal of achieving a zero-emission truck and bus California fleet by 2045.⁷² The Advanced Clean Fleets rule also includes an end of combustion truck sales in 2036. Companies in the commercial sector are already moving to electrify their fleets, with Amazon planning to have 100,000 electric delivery vehicles on the road by 2030.⁷³ If both passenger and commercial EV adoption rates are outpacing EV charging infrastructure, adjustments can be made over time to reflect total EVs as well as charging technologies and consumer behaviors.

While the City cannot require residents or businesses to buy and use EVs rather than gas-powered vehicles, the City will take actions to incentivize this behavior change and support this level of EV adoption. As a part of this strategy, the City's primary target will be to provide one public EV charger for every 20 EVs and ensure as many privately owned chargers are installed in new development as practicable, in line with the leading cities in California (San Francisco, Los Angeles, and San Jose) and recent charging infrastructure studies. Since the City of Santa Barbara already has 132 existing public charging stations⁷⁴, there is currently one public EV charger for every 64 EVs, and the City will need to have 1,788 new public chargers installed to meet the forecasted demand from passenger vehicles by 2030. The actual number and ideal locations for these EV charging stations would need to be further investigated through a Zero Emission Vehicle Action Plan including analysis of greater fast charging infrastructure needed to power the 19 zero-emission commercial truck models set to come to the North American market over the next three years (Action T-7.1).⁷⁵ Increasing the amount of EV charging infrastructure overall will support these vehicles operating in Santa Barbara. As the need for charging infrastructure changes over time depending on new technologies such as smart chargers, megawatt-scale charging systems tailored specifically to medium- and heavy-duty

⁶⁷ <https://www.cpuc.ca.gov/zev/>

⁶⁸ <https://ww2.arb.ca.gov/resources/fact-sheets/governor-newsoms-zero-emission-2035-executive-order-n-79-20>

⁶⁹ <https://spectrumnews1.com/ca/la-west/transportation/2020/10/05/what-it-will-take-to-sell-100--evs-in-california>

⁷⁰ https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes_City_01012020.pdf

⁷¹ <https://ww2.arb.ca.gov/news/california-takes-bold-step-reduce-truck-pollution#:~:text=SACRAMENTO%20%E2%80%93%20Today%2C%20the%20California%20Air,California%20will%20be%20zero%20Emission.>

⁷² <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets/about>

⁷³ <https://www.businessinsider.com/amazon-creating-fleet-of-electric-delivery-vehicles-rivian-2020-2>

⁷⁴ <https://www.plugshare.com/directory/us/california/santa-barbara>

⁷⁵ <https://www.greenbiz.com/article/we-should-be-talking-about-charging-infrastructure-heavy-duty-trucks>

electric trucks, and trends in personal EV adoption, it will be important for the City to continue updating its long-term goals as necessary.⁷⁶

T-6.1 through T-6.3 will account for the majority of the targeted number of EV chargers in 2030 and 2035. A 2015 report by Idaho National Laboratory, *Plugged In: How Americans Charge Their Electric Vehicles*, found that nearly 98% of all EV charging events occurred at home or work.⁷⁷ In support of these findings, and to address the challenges faced by those who may not be able to install their own home chargers, amendment of the Municipal Code (Action T-6-1) to require increased number of electric vehicle capable charging spaces would support increased infrastructure at new and existing commercial and multi-family residential developments. EV-ready building codes are one of the most effective and low-cost strategies for states and local governments to encourage consumers to buy or lease electric vehicles and can save consumers thousands of dollars in installation costs.⁷⁸

Title 24, Part 11, Chapter 5 of the California Green Building Standards Code requires non-residential new construction to provide some parking spaces with electrical infrastructure sufficient to support future installation of electric vehicle supply equipment/system (EVSE).⁷⁹ This strategy ensures that Santa Barbara will have clear guidelines and standards in place for installing EVSE infrastructure. It also calls for creating a streamlined permitting and inspection procedure for EVSE to ensure reduced wait times and costs for new EV owners. Applying for a permit and waiting for an inspector can be time intensive and costly – as many as three separate visits by the installer may be required to apply for the permit, perform the work, and complete the inspection, and a fourth visit may be needed if the utility requires a separate inspection. To avoid this, the City will implement Action T-6.4 and streamline the EVSE permitting and inspection process to further ease the burden on new EV owners and support Measure T-6. The next phase for EVSE expansion will provide additional publicly accessible charging (Action T-6.3).

Establishing a licensing fee for commercial delivery vehicles will also help support Measure T-7 and decrease emissions from the commercial transportation sector. This would provide additional funding for the City to install additional EV charging infrastructure. The retail delivery sector is already trending in this direction, with Amazon revealing its first electric vehicle delivery van in 2020, which began making deliveries in 2021. The company has ordered 100,000 electric delivery vehicles already from electric vehicle maker Rivian.⁸⁰

The methods and assumptions used to calculate the GHG emissions reductions associated with these actions are shown in the table below. The number of new public chargers needed to support Santa Barbara's passenger EV adoption goals were also calculated, shown below in Table 13. This was based on 2020 vehicle registration data from the DMV and the assumption that one public charger should be available for every 20 EVs. The existing 6.83% of passenger EVs and 6.57% of commercial EVs⁸¹ in the City were also taken into account. Total registered vehicles were forecasted based on the 2020 ratio of registered vehicles to population. Emission reductions from the actions in Measure T-6 and T-7 were calculated together as emissions saved by meeting EV adoption goals in 2030 and 2035. Emission reduction calculations are shown below in Table 14.

⁷⁶ <https://www.nrel.gov/transportation/medium-heavy-duty-vehicle-charging.html>

⁷⁷ <https://www.osti.gov/biblio/1369632-plugged-how-americans-charge-electric-vehicles>

⁷⁸ <https://www.swenergy.org/cracking-the-code-on-ev-ready-building-codes>

⁷⁹ <https://codes.iccsafe.org/content/CAGBSC2016/chapter-5-nonresidential-mandatory-strategys>

⁸⁰ <https://www.businessinsider.com/amazon-creating-fleet-of-electric-delivery-vehicles-rivian-2020-2>

⁸¹ EMFAC, 2021

Table 13 EV Charger Count for Passenger Vehicles Calculations

	2030	2035
Population ¹	96,637	100,713
Total registered vehicles ²	127,976	133,374
Registered EV goal ³	38,393	73,356
EVs per charger ⁴	20	20
New publicly available EV chargers needed ⁵	1,788	3,536

¹ Values from forecast. See Appendix A.

² Based on a calculated value for cars for capita (1.321) derived by dividing the total number of registered vehicles in Santa Barbara in 2020 (https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes_City_01012020.pdf) by the 2020 population of Santa Barbara as established in Appendix A.

³ Calculated as total registered vehicles multiplied by EV adoption percentage in above table

⁴ https://theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf

⁵ Based on the assumption that approximately one public EV charger is needed per 20 EVs, taking into account the existing 132 EV chargers already in Santa Barbara. This assumption may change over time due to better technology, changes to consumer behavior, or both. The total number of chargers especially in 2035 will need to be revisited to ensure the numbers reflect the current EV landscape. https://theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf

Table 14 GHG Emissions Reductions from Measure T-6 and T-7

	2030	2035
Passenger Vehicles		
Passenger VMT after alternate transit VMT reductions	825,341,995	876,667,058
EV adoption beyond baseline ²	23%	47%
Passenger Vehicle Emission Factor (MTCO ₂ e/mile) (EMFAC) ³	0.000284942	0.000264718
Emissions Reductions from EV Passenger VMT (MT CO ₂ e) ⁴	54,489	108,063
EV electricity usage (kWh/EV-mile)	0.369	0.369
EV electricity usage from increased EV adoption (kWh)	70,470,365	150,621,912
Electricity EF (lbs CO ₂ e/MWh) ⁵	16.91	4.23
Emissions from electricity usage for EVs	541	289
Total Passenger Vehicle Emission Reductions	53,948	107,774
Commercial Vehicles		
Commercial VMT after mode shift to bikes and transit (VMT) ¹	8,797,048	8,998,020
EV adoption beyond baseline ²	19%	27%
Commercial Vehicle Emission Factor (MTCO ₂ e/mile) (EMFAC) ³	0.00104733	0.00089524
Emissions reduced from EV adoption (MT CO ₂ e) ⁴	1,790	2,144
EV electricity usage (kWh/EV-mile)	1.02	1.00
Additional kWh from new EV miles	1,736,036	2,389,197
Electricity EF (lbs CO ₂ e/MWh) ⁵	16.91	4.23
Emissions from electricity usage for EVs	13	5
Total Commercial Vehicle Emission Reductions	1,777	2,140
Total reductions (MT CO₂e)	55,725	109,914

¹ VMT from forecast (see Appendix A) minus VMT avoided from mode shift to bikes in Strategy T-1

² Baseline EV penetration rates for Santa Barbara County obtained from EMFAC2021. EV adoption beyond the baseline is based on executive order N-79-20 100% of passenger vehicle sales will be electric by 2035. Assuming 15 million EVs by 2035 due to N-79-20 and a 2% growth rate from current vehicle registrations (32,000,000) and a 5% current share of EVs California would be projected to have 25%

	2030	2035
EVs by 2030. 25% is in line with State goals. (https://spectrumnews1.com/ca/la-west/transportation/2020/10/05/what-it-will-take-to-sell-100-evs-in-california)		
³ Derived from EMFAC model output for Santa Barbara County 2030 and 2045; note that EMFAC generates data at the County level, and it is assumed that this is the best available data for the City.		
⁴ Emissions reduced from EV adoption is calculated as the VMT after mode shift, multiplied by the EV adoption beyond baseline percentage multiplied by the weighted vehicle emission factor in that year.		
⁵ The residential electricity emission factor was calculated based on opt-out rates for Santa Barbara according to EMFAC.		

Measure T-8 Electrify or Otherwise Decarbonize 6% of Off-Road Equipment by 2030 and 20% by 2035¹

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
T-8.1	Structural Change, Funding	Align with or exceed AB 1346 and expand enforcement of the ordinance that bans gas powered small off-road engines by 2024 (e.g., lawn and garden equipment). Provide income tiered incentives or buyback programs for burdened residents and businesses. Identify staffing needs for an enforcement and implementation tracking program run by the relevant City department.	2030: 2,857 2035: 9,859
T-8.2	Education	Inform, educate, and support the transition of local employers to zero emission off-road equipment, including major construction companies, manufacturers, landscapers, and warehouse companies.	Supportive
T-8.3	Feasibility Studies	Investigate off-road equipment fleets in the City of Santa Barbara, identify fleets with highest decarbonization potential, and conduct engagement to under-resourced communities to understand how to support conversion.	Supportive
T-8.4	Partnerships, Funding	Partner with Santa Barbara County Air Pollution Control District to expand rebate and incentive programs for upgrading off-road equipment to hybrids, biofuels, or fully electric.	Supportive
T-8.5	Funding	Leverage the grant writer position(s) in strategy A-2.2 to source state funding to decarbonize off-road equipment as a result of Executive Order N-79-20 and State Climate Funding Package.	Supportive
T-8.6	Education	Develop a landscape equipment education and incentive program incentivizing motorized landscape equipment electrification (electric leaf blowers already required, but can get rolled into an education campaign) for hedge trimmers, etc.	Supportive

¹ This would not apply to recreational or commercial marine vessels. The California Air Resources Board currently has regulations in place to develop a performance standard program for commercial marine vessels. This requires zero- emission options where feasible, and cleaner combustion Tier 3 and 4 engines on all other vessels. Implementation of these regulations will occur in 2023 through the end of 2032.

Off-road equipment in Santa Barbara accounts for 7% of the community’s GHG emissions. While only a small part of GHG emissions in the city, achieving carbon neutrality will involve decarbonizing all of the off-road equipment, which currently runs on gasoline, diesel, and natural gas. To support a gasoline and diesel phase-out ordinance for off-road equipment, Action T-8.1 commits the City to enforcing a ban on the operation of gasoline and diesel-powered small off-road equipment by 2024 (in compliance with AB 1346). The City expects that this action will be further supported by future CARB regulations for off-road equipment that may ban their sale in the region by 2035.⁸² While some off-road equipment does not have market-ready zero-emissions alternatives, lawn and garden equipment, light-duty off-road equipment, and portable off-road equipment can generally be

⁸² See: <https://ww2.arb.ca.gov/rulemaking/2021/sore2021>

electrified or use biodiesel today. In 2030, it is forecasted that portable and lawn and garden equipment would make up 16% total off-road equipment.⁸³ Therefore, a 6% reduction in overall off-road emissions is feasible through the enforcement of an off-road electrification ordinance that bans gasoline and diesel-powered portable and lawn and garden equipment.

Action T-8.3 commits the City to investigating the feasibility of reducing emission from major off-road equipment fleets in the City. The study will help the City better understand what types of commercial off-road equipment exists, how old it is, how much potential there is, and how the City can support electrification or decarbonization.

Actions T-8.2, T-8.4, T-8.5, and T-8.6 support implementation through increased education, funding, and equity considerations. These partnerships can ensure that vulnerable communities receive needed resources as well as funding to make the switch.

The methods and assumptions used to calculate the GHG emissions reductions associated with this metric are explained further here and shown in Table 15 below. The GHG reductions were quantified based on a reduction in fuel use by 6 percent and 40 percent from the forecasted fuel consumption in 2030 and 2035, respectively. Forecasted fuel use was obtained from California Air Resources Board’s off-road emissions inventory tool, OFFROAD2021. This model provides annual fuel consumption from various types of off-road equipment operating in Santa Barbara County. The OFFROAD results were allocated to the City of Santa Barbara using population (i.e., recreational equipment, lawn and garden equipment) and employment (i.e., construction and mining equipment, industrial equipment, light commercial equipment, other portable equipment, and transportation refrigeration units) as compared to the county totals.⁸⁴ Off-road diesel, gasoline, and natural gas emissions were acquired through EMFAC fuel usage data and multiplied by respective emissions factors.⁸⁵

Table 15 GHG Emissions Reductions from Measure T-8

	2030	2035
Decarbonized Percentage	6%	20%
Diesel Fuel Use (gal)	2,707,729	2,798,265
Gasoline Fuel Use (gal)	1,866,281	1,946,720
Natural Gas Fuel Use (gal)	399,675	400,051
Weighted Emission Factor ¹	0.009574	0.009581
Fuel Use Reduction (gal)	298,421	1,029,007
Total Reductions (MT CO₂e)²	2,857	9,859

¹ A weighted emission factor for all fuel is based on the forecasted fuel consumption by fuel type and the specific fuel type emission factor.

² Total reductions do not account for the emissions associated with electric to biofuel usage because these emissions would be minimal due to Santa Barbara’s carbon-free electricity.

⁸³ City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum (utilizes CARB's OFFROAD 2021 Santa Barbara County off-road emissions and attributes them to Santa Barbara).

⁸⁴ City of Santa Barbara 2019 Greenhouse Gas Emissions Inventory, Forecast, and Targets Technical Memorandum

⁸⁵ See: <https://arb.ca.gov/emfac/emissions-inventory/c58cfe3d0072dfc3ea8eae4234049042e52ed4df>

4 Water, Solid Waste, and Wastewater Measures

Santa Barbara’s waste measures build on the City’s existing infrastructure and programs that reduce solid waste generation and increase diversion from the landfill. Emphasis is placed on reduction of organic waste sent to landfills, as landfilled organic waste is the major source of waste-related greenhouse gas emissions. The measures in this section also support the City’s overall goal of working toward zero wasted resources such as water. The actions that address inorganic waste have relatively smaller impacts in meeting the City’s communitywide greenhouse gas emissions reduction goals and, therefore, the impact of diverted inorganic waste is not quantified.

The CAP’s water, solid waste, and wastewater measures are as shown in Table 16.

Table 16 Water, Solid Waste, and Wastewater Measures

Measure #	GHG Emissions Reduction Measures	Anticipated Reduction/ Sequestration (MT CO ₂ e)
W-1 (Municipal)	Increase municipal procurement of recovered organics waste products.	Supportive
W-2 (Municipal)	Reduce municipal water consumption.	Supportive
W-3	Reduce per capita potable water consumption 1.05% by 2030 and 1.58% by 2035.	2030: 1.72 2035: 0.67
W-4	Reduce organic waste 80% below 2014 levels by 2030 and 85% by 2035.	2030: 45,773 2035: 50,271

The City has been successful in reducing potable water consumption through implementation of programs and policies in the Enhanced Urban Water Management Plan, enforcing the Model Water Efficient Landscape Ordinance, increasing the available supply in infrastructure for use of recycled water, and providing water efficient devices and appliance incentives.

Measure W-1 (Municipal) Increase Municipal Procurement of Recovered Organics Waste Products

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
W-1.1	Structural Change, Funding	Require City agencies to procure and apply compost generated from municipal organic waste to the exterior of suitable facilities as part of their operations.	Supportive
W-1.2	Structural Change	Increase signage for municipal buildings, parking, and sidewalk bins on accepted landfill, recyclable, and compostable materials.	Supportive
W-1.3	Feasibility Studies	Investigate opportunities for procuring recovered organic waste products within municipal facilities.	Supportive

Measure W-1 includes municipal actions to increase the use of organic waste for all City agencies. This measure is not quantified because emission reductions are captured in the community-wide emission reductions.

Measure W-2 (Municipal) Reduce Municipal Water Consumption

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
W-2.1	Foundational	Continue implementing City policies for water-conserving equipment upgrades and practices at City government facilities. Implement additional facility, landscape, and procedure improvements to further conserve water as identified and determined feasible.	Supportive
W-2.2	Structural Change, Foundational	Create a Green Community Infrastructure Program based on the Stormwater BMP Guidance Manual with upgraded public spaces, green parking lots, green alleys and increased green stormwater infrastructure on City facilities.	Supportive

Measure W-2 includes municipal actions to improve landscaping and infrastructure on City green spaces with the goal of reducing water usage. Energy used to transport water is low and has minimal carbon emissions due to SBCE's provision renewable energy. Even so, water conservation is important as California expects to experience more drought conditions in the future. Emission reductions associated with this measure are not quantified since reductions are captured in the community-wide emission reductions.

Measure W-3 Reduce Per Capita Potable Water Consumption 1.05% by 2030 and 1.58% by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
W-3.1	Structural Change, Foundational	Implement all cost-effective measures identified in the Water Conservation Strategic Plan.	2030: 1.72 2035: 0.67
W-3.2	Structural Change, Funding	Leverage the grant writer position(s) in strategy A-2.2 to source funding for the Water Conservation Strategic Plan programs and rebates.	
W-3.3	Education, Foundational	Educate the community through the Water Resources division of Public Works to understand available incentives, options, and programs to reduce per capita water use.	
W-3.4	Education	Expand public engagement campaigns to promote the available rebates through the City's Water Conservation Programs.	
W-3.5	Education	Utilize available enhanced water consumption data from the City's Automated Metering Infrastructure, along with the WaterSmart customer portal, to educate water customers about water use patterns and leak detection.	
W-3.6	Funding, Equity	Leverage the grant writer position(s) in strategy A-2.2 to provide specialized rebate or other funding to low and medium incomes homes for installing laundry to landscape, rainwater catchment system, low-flow appliances, and fixing water leaks.	

Action W-3.1 commits the City to implementing all cost-effective measures identified in the Water Conservation Strategic Plan. The Water Conservation Strategic Plan provides measures for commercial uses, residential uses, irrigation, and community and education. Action W-3.2 leverage grant writer position(s) to implement the Water Conservation Strategic Plan. Actions W-3.3 and W-3.4 commit the City to continuing public engagement and conservation programs, focusing on frontline communities. Engagement on these topics has been shown to improve the efficacy of

structural changes to water systems and build community wide trust and stewardship.⁸⁶ The City will also expand existing programs to provide specialized rebate or other funding to low and medium income homes for installing laundry to landscape, rainwater catchment system, low-flow appliances, and fixing water leaks. These actions provide funding for integrating more water conservation practices into the City’s households, providing more opportunity for lower-income residents to adopt these technologies.

Because the City has other methods of tracking and calculating water use reduction in the city and the emission reduction associated with water use reduction is minimal; a simple percent reduction from the forecasted projection was applied. The 2035 reduction is lower than 2030 due to the expected decreasing electricity emissions factor in line with the City’s carbon-free electricity.

Table 17 GHG Emissions Reductions from Measure W-3

	2030	2035
Water use reduction	1.05%	1.58%
Imported water delivery (acre feet)	475	491
Water Emissions (MT CO ₂ e)	163	42
Total Reductions (MT CO₂e)	1.72	0.67

Measure W-4 Reduce Organic Waste 80% below 2014 levels by 2030 and 85% by 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
W-4.1	Foundational	Meet the requirements of SB 1383 to reduce organics in the waste stream by 80% below 2014 levels. Include existing activities of: <ul style="list-style-type: none"> • Pilot and evaluate emerging technologies like at-source organic waste digestion to reduce organic waste by restaurants and other major food waste producers. • Implement enforcement and fee for incorrectly sorted materials with sensitivity to shared collection. • Increase bin signage across commercial and residential areas of acceptable landfill, recyclable, and compostable materials. 	2030: 45,773 2035: 50,271
W-4.2	Education, Funding	Create a templated training for businesses to educate their employees about circular economy-based practices annually by providing training resources and rebate program to fund employee time for training. Support lower-impact reusable and reduced packaging businesses.	Supportive
W-4.3	Education, Equity	Conduct targeted multicultural education and assistance campaigns to enhance reuse, ways to prolong the useful life of common materials and items, and sustainable purchasing practices.	Supportive
W-4.4	Education	Conduct a Bring Your Own (BYO) education and outreach training for the community on reusables and implementing more sustainable packaging into daily use. Provide resources of education on City website. Educate community on food scraps on resource center.	Supportive
W-4.5	Feasibility Studies	Conduct waste characterization studies every 4-5 years to inform programs and policies. Leverage study to understand the waste stream and create a plan to increase diversion and reduce contamination.	Supportive

⁸⁶ Dean AJ, Fielding KS, Ross H and Newton F. (2016) Community Engagement in the Water Sector: An outcome-focused review of different engagement approaches. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities. Accessed here: https://watersensitivecities.org.au/wp-content/uploads/2016/05/TMR_A2-3_CommunityEngagementWaterSector-1.pdf

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
W-4.6	Partnerships, Structural Change	Collaborate with the County and Resource Conservation District to develop a regional compost trading program to provide farmers with compost to meet organic procurement target set by SB 1383.	Supportive
W-4.7	Funding	Establish regional consortium to plan and pursue funding for infrastructure beyond 2025 SB 1383 targets.	Supportive
W-4.8	Equity, Education	Establish relationships with multi-unit property owners/managers to develop signage for their properties. Go door-to-door at each multi-unit unit yearly to provide supplies and education for proper sorting.	Supportive
W-4.9	Equity, Education	Conduct outreach campaign to low and medium -income residents educating them on issues related to abandoned waste and informing them on how to access bulky item and abandoned waste services at no cost.	Supportive
W-4.10	Structural Change, Partnerships	Partner with the harbor, airport and other major Santa Barbara facilities to facilitate no single use plastic practices.	Supportive
W-4.11	Structural Change, Foundational	Continue to provide different bin size options for green waste, recycling, and trash at different costs (smaller bins being cheaper options) and work towards discontinuing the use of larger waste containers as feasible.	Supportive
W-4.12	Structural Change, Foundational	Ban items without means of recycling or recycling markets, such as sale of polystyrene, produce bags, plastic packaging, straws, plastics #4-7, and mixed materials.	Supportive
W-4.13	Structural Change	Implement pilot project for reusable restaurant to-go containers.	Supportive
W-4.14	Structural Change, Partnerships	Explore opportunities to promote a "circular economy" among local manufacturers and industry. Build on existing AB 619 legislation to fund temporary or permanent food facility item reuse.	Supportive
W-4.15	Education, Partnerships	Partner with libraries and other existing facilities to market campaigns about waste reductions, reuse, and repair.	Supportive
W-4.16	Feasibility Studies, Partnerships	Partner with UCSB, ICLEI and other organizations to cost effectively evaluate and develop resources around consumption-based emissions. Utilize consumption-based emissions inventory to understand Santa Barbara's most carbon intensive consumption habits and emission reduction potential and promote closed-loop circular economy. Based on the results, create a plan to achieve the objective of zero growth of waste generation. Consider reusable diaper service, plant-based diets, etc.	Supportive
W-4.17	Equity, Education	Create a training/education program that is free and accessible to all residents and employees to learn about circular economy practices and diversion strategies and effects of overconsumption.	Supportive

As of 2021, Santa Barbara's ReSource Center, a state-of-the-art waste management facility, came online to increase the community's recycling rate to above 85%, generate resources such as green energy and compost, and dramatically lower local greenhouse gas emissions.⁸⁷ The ReSource Center converts commercial and residential waste into resources by recovering recyclable materials, transforming organics into landscape nutrients, and creating renewable energy in the process.

The Resource Center works to address two factors: 1) waste generation (reducing the amount of waste generated regardless of its destination such as landfilling, recycling, and composting); and 2)

⁸⁷ https://lessismore.org/material_categories/9-trrp/

waste diversion (i.e., recycling the waste that is generated through available facilities). Measure W-4 provides quantitative goals addressing waste generation and diversion.

Actions for reducing organic waste are underpinned by SB 1383 requirements, which lay out specific programs, policies, and objectives for the City to support the state's goal of a 75% reduction from 2014 levels in organics waste by 2025. While not explicitly modeled, many of these actions support the achievement of SB 1383 goals. Actions that address inorganic waste are not quantified in this analysis due to their very minimal impact on communitywide greenhouse gas emission reduction goals.

Emission reductions in the waste sector are already being implemented due to the new ReSource Center and driven by the City surpassing compliance with SB 1383, which sets a statewide target to reduce organic waste disposal 75 percent relative to 2014 levels and recover 20 percent of edible food by 2025. CalRecycle has provided a suite of activities that jurisdictions are required to complete to achieve this target, including the following:

- Provide organic waste collection services for all residents and businesses and monitor contamination.
- Implement an edible food recovery program for commercial edible food generators, with compliance beginning between 2022 and 2024.
- Procure organic waste to meet organic waste product procurement targets as notified by CalRecycle by 2022.
- Conduct education and outreach to businesses, residents, and commercial edible food generators by 2022 and annually thereafter.
- Ensure there is adequate capacity and collection services to comply with SB 1383 requirements.
- Adopt enforceable ordinances prior to 2022 encompassing requirements for organics and edible food generators in the City.
- Monitor compliance beginning in 2022, conduct enforcement beginning in 2024, and maintain records of implementation.

The City is expected to provide the level of composting and food donation that will exceed SB 1383 requirement of organic waste disposal by 75% by 2025. Landfilled organics are a large source of methane emissions and the majority of anaerobic waste emissions, as such it is assumed that an 80% reduction in organic waste equates to an 80% reduction in emissions.⁸⁸

Educational actions such as W-4.2, W-4.3, W-4.4 will not lead to direct GHG emission reductions but they are critical components of the strategy behind SB 1383 implementation. For example, education around composting and food waste reduction can provide the information needed by residents to start a home compost pile and reduce their overall waste. Providing these materials in multiple languages in a culturally appropriate manner will further the impacts of this action.

Action W-4.5 and W-4.17 encompass studies and plans that will not directly impact GHG emissions but will support the City's goal to reduce all waste generation. Action W-4.6 will directly support implementation of SB 1383, as providing farmers with compost to meet organic procurement target falls within SB 1383's scope.

⁸⁸ See:

<https://calrecycle.ca.gov/climate/organics/#:~:text=Anaerobic%20decomposition%20of%20organic%20materials,a%2020%2Dyear%20time%20period.>

Action W-4.3 will support SB 1383’s targets by enacting a local ordinance to reduce single use items across the City. Adoption is further encouraged through partnerships with local businesses in Action W-4.2 and W-4.14 promoting reusable items to reduce general waste production.

Additionally, these actions complement Measure CS-2 which is to increase carbon sequestration by applying 0.08 tons of compost per capita annually in the community through 2030 and 2045. See *Section 5 Carbon Sequestration*.

The methods and assumptions used to calculate the GHG emissions reductions associated with metrics in Measure W-4 are shown in Table 18 below. As mentioned previously, the ReSource Center already began meeting the SB 1383 organic waste diversion obligation in 2021 and Measure W-4 is intended to exceed the compliance obligation. Therefore, the table below presents the amount of GHG reductions achieved with the ReSource Center meeting the compliance obligation and exceedance of the obligation to be achieved with implementation of Measure W-4. The GHG emissions reduction benefits associated with organic diversion were quantified by multiplying the forecasted waste emissions by the target organics diversion rate. This is because organic materials are anaerobically converted into methane and make up 100% of landfill related methane emissions.⁸⁹ The actual diversion rate will be tracked on an annual basis and if there is a circumstance in which the City doesn’t achieve the incremental targets the CAP will be updated accordingly.

Table 18 GHG Emissions Reductions from Measure W-4

Calculations	2030	2035
Waste Emissions	57,216	59,142
ReSource Center Organic Waste Diversion Compliance Obligation (%)	75%	75%
Emissions Reduction from continued ReSource Center SB 1383 Compliance	42,912	44,357
Measure W-4 Organic Waste Target Achievement (%)	80%	85%
Exceedance of SB 1383 Compliance Obligation (%)	5%	10%
Emissions Reduction from exceedance of SB 1383 Compliance Obligation	2,861	5,914
Total Reductions (MT CO₂e)	45,773	50,271

⁸⁹ US Community Protocol Appendix E – Solid Waste <https://icleiusa.org/ghg-protocols/>

5 Carbon Sequestration

Carbon sequestration describes the process in which plants and water-based algae take carbon from the atmosphere and store it in their biomass via photosynthesis. Plants also release carbon, in the form of carbohydrates and other molecules (collectively called exudates), into the soil through their roots, where they increase soil organic carbon and support a diversity of soil microbes and fungi, which facilitate soil carbon sequestration. Natural lands act as carbon sinks by sequestering carbon from the atmosphere and storing it in vegetation and soils, playing an increasingly important role in pursuing state carbon neutrality goals. Maintaining healthy natural lands is key to human well-being as they are responsible for our water supply and quality, air quality, and biodiversity, which in turn influences socioeconomics and social equity.

Carbon capture involves the capture of GHG emissions from industrial processes, such as steel and cement production, or from the burning of fossil fuels in power generation. This carbon is then transported from where it was produced, via ship or in a pipeline, and stored deep underground in geological formations. The CAP’s carbon sequestration and carbon capture measures are as shown below.

Table 19 Carbon Sequestration Measures

Measure Number	GHG Emissions Reduction Measures	Anticipated Reduction/ Sequestration (MT CO ₂ e)
CS-1	Increase carbon sequestration by maintaining existing trees and natural lands and by planting 4,500 new trees throughout the community by 2030.	2030: 159 2035: 159
CS-2	Explore new carbon sequestration and carbon capture opportunities.	Supportive
CS-3	Maintain and expand existing restoration projects to sequester carbon through a 25-acre net increase in restored land areas by 2030.	Supportive
CS-4	Increase carbon sequestration by applying 0.08 tons of compost per capita annually in the community through 2030 and 2035.	2030: 1,778 2035: 1,853
CS-5	Reduce GHG emissions of residential and commercial building materials 20% by 2030 and 40% by 2035 in line with AB 2446.	Supportive

Santa Barbara's Parks and Recreation system includes over 1,800 acres of parkland including developed parks, open space, beaches, trails, and sports facilities. The Santa Barbara Parks and Recreation Department has a Creeks Restoration and Water Quality Improvement Division (Creeks Division) which has a mission to improve creek and ocean water quality and restore natural creek systems through storm water and urban runoff pollution reduction, creek restoration, and community education programs. To accomplish this mission, the Creeks Division executes large capital projects to reconstruct creeks and wetlands, returning them to more natural conditions by reshaping the creek channels, removing of aging infrastructure, manage invasive species, and install native plants and trees. These projects have many benefits, including increasing carbon sequestration. The measures and actions in this CAP build off of existing City programs to expand their impact and quantify the carbon sequestration associated with them. Carbon sequestration quantification and tracking is a relatively newer field. However, with the large role carbon sequestration will play in meeting state and the City’s carbon neutrality goals, communities are beginning to take a conservative approach to carbon sequestration quantification as a starting point while the state develops more specific goals and guidance. Passed in 2022, AB 1757 directs the

California Natural Resource Agency to determine carbon sequestration reduction targets by 2024 and develop a methodology to track them by 2025. Once that is completed, the City will integrate those goals and tracking methods within these measures and actions and update them as needed.

Measure CS-1 Increase Carbon Sequestration by Maintaining Existing Trees and Natural Lands and by Planting 4,500 New Trees throughout the Community by 2030

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
CS-1.1	Education, Structural Change, Partnerships	Continue to implement and expand the City's Urban Forest Management Plan to include goals for promoting street tree health, enhancing resiliency, increasing the environmental benefits and co-benefits resulting from street trees and shading, community engagement around the urban forest. Include activity to promote street tree health and maintaining existing trees through partnerships with the community and local non-profits.	2030: 159 2035: 159
CS-1.2	Structural Change, Feasibility Studies	Continue to look for opportunities to increase carbon sequestration via land acquisitions and tree protections in alignment with the City's Open Space, Parks and Recreation Element.	Supportive
CS-1.3	Structural Change, Foundational	Implement the City's Community Wildfire Protection Plan to reduce fire risk and carbon loss due to wildfires by conducting vegetation management throughout the City. Ensure that vegetation management projects minimize full removal of vegetation or conversion of land cover type from a higher carbon sequestration land cover (shrubs and trees) to a lower carbon sequestration land cover type (annual grasses).	Supportive
CS-1.4	Feasibility Study	Develop a City-wide, or participate in a regional, carbon sequestration analysis and plan to explore opportunities to increase sequestration in the City.	Supportive
CS-1.5	Structural Change, Equity, Education	Implement the City of Santa Barbara's Creek Tree Program to assist private creekside landowners with improving wildlife habitat along creeks in Santa Barbara through the protection and planting of native trees. Develop a wildlife habitat installation program where the City provides carbon sequestering plants and creek trees and removes non-natives as feasible for appropriate creekside properties. Prioritize low-income areas for implementation of the Creek Tree Program and keep an updated publicly accessible page on the City website with important information about the program.	Supportive
CS-1.6	Feasibility Studies	Update tree canopy coverage data within the City to measure the change in coverage over time as it relates to sequestration as part of the next Urban Forest Management Plan update.	Supportive
CS-1.7	Partnerships	Invest and participate in regional development of local carbon off-set program in partnership with the County and/or Central Coast Regional Collaborative.	Supportive
CS-1.8	Equity	Prioritize low-income areas of the City with less existing tree canopy for tree plantings and increase shading in gathering spaces.	Supportive

Action CS-1.1 is to continue to implement the City's Urban Forest Management Plan and expand the goals to capture more co-benefits. The City has a robust urban forest management program that involves a number of City departments including Parks and Recreation, Public Works, Community Development, and Fire. Planting and maintenance of City trees is primarily the responsibility of the Parks and Recreation Department. Other departments such as Fire, Community Development, and Public Works are involved as part of public safety, public capital improvement projects, and land use planning and development. Public review and policymaking related to tree planting, maintenance, and preservation is provided by the Street Tree Advisory Committee, Parks and Recreation

Commission, Single Family Design Board, Historic Landmarks Commission, Architectural Board of Review, Planning Commission, and City Council. There are also additional planning efforts that support the urban forest management program including the Street Tree Master Plan, Santa Barbara Municipal Code (e.g., Chapter 15 and Chapter 22), the Local Coastal Plan, and the General Plan. Additionally, Action CS-1.2 looks to update the Open Space, Parks and Recreation Element to include policy guidance and support for activities to increase carbon sequestration.

Continued expansion and implementation of the urban forest management program, especially to focus on under-resourced communities, will need strong community partnerships and education. Action CS-1.5 and CS 1.6, and CS-1.8 look to Identify and partner with local community-based organizations with connections to under-resourced communities to assist with identification of priority planting areas, provide education, and support community tree planting events.

Due to the success of the City’s programs and the additional actions in this measure, City could set a goal of planting and maintaining an additional 4,500 trees by 2030. The City does not currently have a confirmed goal for tree planting past 2030. However, the 4,500 trees planted by 2030 will continue to sequester carbon on an annual basis throughout their lifespan. GHG emission reductions were estimated based on the number of trees to be added to the inventory and the average CO₂e accumulation factor per tree (0.0354 MT CO₂e/tree/year).⁹⁰ The calculations and assumptions used to estimate emission reductions from Measure CS-1 are provided in Table 20. Although there many actions under CS-1 that collectively support substantial increases in carbon sequestration, this analysis conservatively only quantifies carbon sequestration associated with planting trees. As more feasibility studies are done (Actions CS-1.4 and CS-1.6) and more tracking and monitoring are put in place, then the City will have additional substantial evidence to better quantify carbon sequestration reduction potential. Although not quantified here, urban greening can further reduce building carbon emissions by reducing the heat island effect in cities which reduces the need to rely on air conditioning in homes.⁹¹

Table 20 Measure CS-1 GHG Emission Reduction Calculations

Calculation Factor	2030	2035
Newly Planted Trees (compared to 2019)	4,500	4,500
Tree Sequestration Factor (MT CO ₂ e/tree/year) ¹	0.0354	0.0354
Total GHG Emissions Reductions (MT CO₂e)	159	159

Notes: MT CO₂e = metric tons of carbon dioxide; kWh =-kilowatt-hour Values may not add up due to rounding

¹ Default annual CO₂e sequestration per tree per year with a maximum lifespan of 20 years per tree is 0.0354 MT CO₂e/tree/year was obtained from CAPCOA. 2010. Quantifying Greenhouse Gas Mitigation Measures.

Measure CS-2 Explore New Carbon Sequestration and Carbon Capture Opportunities

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
CS-2.1	Partnerships, Feasibility Studies	Create an organizational body (internally within the City or through a partnership like with UCSB or the Santa Barbara Botanical Garden) to lead program development and research for facilitating emergent carbon sequestration and carbon capture plans relevant to the City.	Supportive

⁹⁰CAPCOA. 2011. Quantifying Greenhouse Gas Mitigation Measures. <http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf>

⁹¹The Trust for Public Land (TPL). Quantifying the greenhouse gas benefits of urban parks. August 2008.

CS-2.2	Education	Pilot and promote carbon sequestering construction materials like low-carbon concrete and mass timber.	Supportive
CS-2.3	Education, Partnerships	Work with local architects, construction trades, and workforce development organizations to expand industry knowledge and adoption of carbon sequestering building materials and techniques.	Supportive
CS-2.4	Feasibility Studies	Conduct a feasibility study to explore carbon capture and storage opportunities for the community.	Supportive
CS-2.5	Feasibility Studies, Partnerships	Initiate a study partnering with local academic institutions and the ReSource Center to identify and research ways to create a circular economy around organic waste and increasing edible food rescue.	Supportive
CS-2.6	Feasibility Studies	Conduct a feasibility study to explore repurposing biosolids into biochar locally and replacing conventional fertilizer through Public Works.	Supportive
CS-2.7	Partnerships, Feasibility Studies	Invest in the existing kelp farming efforts by studying regional environmental impacts and sequestration potential through a partnership with UCSB.	Supportive
CS-2.8	Partnerships	Partner with furniture, home renovation, and construction companies to promote sustainable and locally harvested timber to reduce embodied carbon from transit of construction materials and reduce the price premium of emerging timber uses.	Supportive
CS-2.9	Funding	Leverage the grant writer position(s) in strategy A-2.2 to expand funding for the carbon sequestration program.	Supportive
CS-2.10	Equity	If there are localized co-benefits to any sequestration projects focus development, when possible, to benefit historically adversely impacted under-resourced communities.	Supportive

Measure CS-2 focuses on exploring new carbon sequestration and carbon capture opportunities in the City of Santa Barbara. Over time as GHG emissions are reduced from more and more sectors, carbon sequestration and carbon removal will play an increasingly important role in California's and the City's ability to achieve carbon neutrality. The measure includes several actions aimed at facilitating research, partnerships, education, feasibility studies, and funding to identify and develop potential carbon sequestration projects. Actions CS-2.1, CS-2.2, CS-2.3, CS-2.4, and CS-2.6 focus on establishing partnerships with various entities, such as UCSB, the Santa Barbara Botanical Garden, and local academic institutions, to conduct research and development in the field of carbon capture and sequestration. This approach acknowledges that the technology for high levels of carbon capture and sequestration may not be readily available or cost-effective for the City to pursue independently at this time. Actions CS-2.5 and CS-2.7 propose investing in existing local efforts, such as the ReSource center and kelp farms, to expand carbon sequestration opportunities and promote the development of a circular economy. This highlights the City's commitment to utilizing available resources and infrastructure to advance carbon sequestration goals. Action CS-2.9 supports the measure through focusing on funding opportunities specific to carbon capture and sequestration such as through CARB. This demonstrates a proactive approach to seeking financial support for the implementation of carbon capture and sequestration projects. Action CS-2.10 will promote how identified carbon capture and sequestration opportunities bring benefits to the underserved communities. The potential for GHG reduction via carbon capture and carbon sequestration varies drastically depending on the technology and methods used for carbon capture and sequestration. Therefore, until the technology or means for carbon capture is identified, the measure remains supportive and will not be quantified until adequate data is available from an implementable project.

Measure CS-3 Maintain and Expand Existing Restoration Projects to Sequester Carbon through a 25-acre Net Increase in Restored Land Areas by 2030

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
CS-3.1	Structural Change, Partnerships, Equity, Education	Develop a Citywide restoration plan in partnership with the Creeks Division, Parks and Recreation, and Public Works to achieve target net increases in restored land area and waterways. Prioritize implementation of restoration projects in disadvantaged communities. Facilitate community outreach through surveys and public meetings on ways to best restore lands and waterways within the City as well as identify additional priority areas.	Supportive
CS-3.2	Structural Change, Equity	Should parcels be identified for potential rezoning from their existing state to a park or open space, consider the following: 1) Provide flexible solutions for developing urban parks in infill areas where traditional neighborhood and community parks are not feasible; 2) Aim to achieve the greatest carbon sequestration possible, given constraints around use and amenities to be included. Use and amenities are determined by Parks and Recreation staff through a community process; and 3) Selection of parcels be made with an aim to serve underserved communities.	Supportive
CS-3.3	Partnerships	Expand Creeks Division volunteering programs to help maintain creek restoration projects. Coordinate projects with Parks and Recreation and Sustainability and Resilience Departments.	Supportive
CS-3.4	Structural Change, Feasibility Studies, Education	Facilitate annual reporting as part of the urban forestry, wildfire prevention, and City-wide restoration efforts by developing and maintaining existing projects to gauge progress over time and identify any gaps related to ongoing projects. Incorporate GHG reduction calculations into this monitoring plan.	Supportive
CS-3.5	Funding, Foundational	Leverage the grant writer position(s) in strategy A-2.2 to pursue funding for restoration activities with a focus on projects that have not reached completion due to funding constraints.	Supportive
CS-3.6	Structural Change, Foundational	Include long term maintenance in restoration planning and implementation by partnering with the community and local organizations to assist in maintenance activities. Include continued maintenance and expansion of Creeks Division projects of the Upper Las Positas Creek, Mission Creek, Palermo Open Space, Arroyo Burro, and the Andree Clark Bird Refuge.	Supportive

Measure CS-3 includes actions to facilitate and track City-led restoration efforts that will help to increase carbon sequestration. Implementing and tracking restoration efforts that increase carbon sequestration will be critical for the City to meet its 2035 carbon neutrality goal. Action CS-3.1 includes a restoration plan that will provide goals, targets, and actions to facilitate restoration throughout the city. Actions CS-3.3, CS-3.5, and CS-3.6 develop volunteer programs, partnerships, and grant funding positions(s) to help implement CS-3.1. CS-3.4 will create a reporting program to showcase the City’s progress and monitor GHG sequestration. As the goals and targets for carbon sequestration associated with restorations have yet to be developed, the measure is not yet quantified.

Measure CS-4 Increase Carbon Sequestration by Applying 0.08 tons of Compost per Capita Annually in the Community through 2030 and 2035

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
CS-4.1	Structural Change	Enforce compliance with SB 1383 and aim to exceed the baseline requirement by establishing a minimum level of compost application per year on applicable/appropriate land throughout the City including City-owned land twice that of SB 1383 requirements.	2030: 1,778 2035: 1,853
CS-4.2	Feasibility Studies	Identify additional locations within the City to apply compost and provide household incentives for small-scale implementation.	Supportive
CS-4.3	Structural Change	Maintain procurement policies to comply with SB 1383 requirements for jurisdictions to purchase recovered organic waste products.	Supportive
CS-4.4	Partnerships, Education	Work with the ReSource Center to provide residents, businesses, and developers with educational material on where compost can be acquired and how it can be used (i.e., landscaping).	Supportive
CS-4.5	Partnerships	Collaborate with Santa Barbara Community College, UC Santa Barbara, local schools, and Public Works to identify opportunities to apply compost to landscaping.	Supportive

Compost is also discussed under Measure W-4 because compost application is part of the overall waste management process and is a requirement under SB 1383. The City surpassed compliance with SB 1383, which sets a statewide target to reduce organic waste disposal 75 percent relative to 2014 levels and recover 20 percent of edible food by 2025. CalRecycle has provided a suite of activities that jurisdictions are required to complete to achieve this target, which includes waste product procurement targets.

The ReSource Center began meeting the SB 1383 procurement obligation in 2021. Measure CS-4 is intended to ensure the City continues to meet the procurement obligation in the future. Actions CS-4.1 through CS-4.5 build upon existing City programs but provide additional support to identify application gaps (Action CS-4.2), improve processes (CS-4.3), provide education (Action CS-4.4) and develop additional partnerships (Action CS-4.5). Emission reductions associated with procurement of 0.08 tons of recovered organic waste products, such as compost, per person are demonstrated in Table 21 below.

Table 21 GHG Emissions Reductions from Measure CS-4

Inputs and Assumptions		
City procurement requirement in 2021 (tons) ¹	7,444	
City population that procurement is requirement based on ¹	93,055	
Procurement requirement per capita	0.0800	
Emission reduction factor associated with mixed organics compost application due to avoided landfill emissions, decreased soil erosion, decreased fertilizer use (MT CO ₂ e/ton) ²	0.23	
Calculations	2030	2035
Population	96,637	100,713
Estimated procurement requirement (tons)	7,731	8,057
City Recovered Organic Waste Product Procurement Obligation (%)	100%	100%
Measure CS-4 Procurement Target (%)	100%	100%

Emissions Reduction from Continued ReSource Center SB 1383 Compliance of Procurement Requirements (MT CO₂e)³	1,778	1,853
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¹ <https://calrecycle.ca.gov/organics/slcp/procurement/recoveredorganicwasteproducts/>

² <https://ww2.arb.ca.gov/sites/default/files/classic/cc/waste/cerffinal.pdf>

³These emissions are also associated with the implementation of Measure CS-2. To review the actions that will implement Measure CS-2 are discussed in Section 5 *Carbon Sequestration*.

Measure CS-5 Reduce GHG Emissions of Residential and Commercial Building Materials 20% by 2030 and 40% by 2035 in Line with AB 2446

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
CS-5.1	Feasibility Studies	Conduct a feasibility study on carbon capture technologies to locally produce calcium carbonate (low carbon concrete) creating sequestration via construction materials. Determine viability within the City and project demand.	Supportive
CS-5.2	Partnerships, Feasibility Studies	Partner with UCSB to pilot a building specific embodied carbon reduction project for planned construction.	Supportive
CS-5.3	Moonshot	Develop a strategic construction and procurement plan to promote construction projects that use alternative materials to reduce embodied carbon. Include scoring criteria in City request for proposals for construction projects that identify resilience features such as water and energy efficiency, reduced urban heat, and decrease the embodied carbon in line with AB 2446.	Supportive

AB 2446, adopted in 2022, requires CARB to develop a strategy for achieving a 40 percent net reduction in the embodied carbon in building materials by end of 2035.⁹² As part of this bill, CARB is also tasked with developing a framework for measuring and tracking the reduction in building material carbon intensity by 2025. Measure CS-5 supports the state’s efforts to reduce embodied carbon emissions in construction materials and prepares the City for legislation related to building materials that may be passed in the coming years. Under Action CS-5.1 the City will conduct a feasibility study to evaluate the viability of products like low carbon concrete and carbon sequestering concrete. Concrete is one of the most extensively used materials in buildings and traditional manufacturing of concrete is a carbon intense process.⁹³ There are a number of emerging technologies that reduce the emissions from concrete production as well as technologies for using concrete as a means to sequester carbon emissions.⁹⁴ Understanding the feasibility of other building materials is the first step to development a strategy to reduce embodied emissions in building materials. Through Action CS-5.2 the City will develop a partnership with UCSB to pilot a project focused on reducing embodied carbon in building construction. This collaborative effort aims to explore and implement strategies to minimize the carbon footprint associated with planned construction projects. By leveraging the expertise of UCSB, the City, can benefit from cutting-edge research and innovative approaches to reduce GHG emissions in the building environment. Action CS-5.3 is a moonshot effort by the City that would involve the development of a strategic construction and procurement plan to promote of alternative materials with lower embodied

⁹² 2022 - Assembly Bill 2446 (Holden, Chris), Embodied Carbon Emissions: Construction Materials (Chaptered) | California Air Resources Board

⁹³ Jeremy Gregory, Hessam Azarijafaris, Ehsan Vahidi, and Randolph Kirchain. September 2021. The role of concrete in life cycle greenhouse gas emissions of US buildings and pavements. PNAS Vol. 118 No. 37. Accessed Here: <https://www.pnas.org/doi/full/10.1073/pnas.2021936118>

⁹⁴ CarbonCure's Sustainable Concrete Solution - Concrete Technology Reducing Carbon Impact

carbon and construction designs that increases climate resiliency. At this time the Measure is supportive to the overall efforts of the City but is not quantifiable since lifecycle emissions are not quantified in the overall GHG inventory.

6 Community Climate Potential

Any increase in government and private sector spending related to the CAP and associated greenhouse gas reduction measures will generate economic activity, resulting in changes to employment. To meet the City’s goals in the CAP, the City will need to help transform its economy into one that supports a zero-carbon future and moves toward energy efficiency. This greener economy will involve an increasing number of sectors with lower carbon outputs and decreased environmental impacts. Early studies show that there will be some economic decline in certain industries and limited job losses; however, the overall economic impact is expected to be net positive. For this reason, it is important that the City needs to address equity explicitly in the green transition. Ensuring equitable outcomes result from transformative climate investments is critical. Measure CP-1 outlines the City’s plan to integrate innovation and equity into the green economy.

Measure CP-1 Encourage Community Innovation and Empower the Local Green Economy through Investment in a Green Technology Workforce

Action Number	Strategic Theme	Action	Anticipated Reduction (MT CO ₂ e)
CP-1.1	Structural Change	Create a Green Technology incubator in partnership with UCSB to determine technological advancement research into clean power, built environment advancement, and carbon sequestration.	Supportive
CP-1.2	Funding	Leverage the grant writer position(s) in strategy A-2.2 to source funding for the Green Technology incubator through involvement of venture capitalist and private equity firms.	Supportive
CP-1.3	Education	Facilitate workforce training by partnering with local academic institutions to offer scholarships for students pursuing climate trades.	Supportive
CP-1.4	Education	Partner with Santa Barbara Community College and/or UCSB to develop a clean energy technology certificate program.	Supportive
CP-1.5	Moonshot	Leverage the grant writer position(s) in strategy A-2.2 to establish an Innovation Bootcamp with funding from SBCE to encourage forward thinking sustainability and resilience ideas and pilots. The Innovation Bootcamp will be tiered based on stages.	Supportive
CP-1.6	Moonshot	Create a climate innovation competition for local area students where the prize is a scholarship or grant.	Supportive

Green jobs are broadly defined as occupations that include tasks associated with meeting green economic goals and improving the environment. This could be jobs in businesses that produce goods or provide services that conserve natural resources or reduce the environmental impact of production processes. Green goods, services, and production processes typically fall into the following categories of economic activity: renewable energy; energy efficiency; greenhouse gas reduction; pollution reduction and cleanup; recycling and waste reduction; natural resources conservation; and education, compliance, public awareness and training.

Green jobs may include, but are not limited to, the following:

- Clean renewable energy
- Public transportation
- Waste management/recycling

- Eco-tourism
- Sustainable agriculture
- Land conservation/remediation
- Construction/Building remediation

These measures and actions in the CAP will increase spending on projects that are expected to increase employment in these jobs. While increased jobs are generally viewed as a positive impact, Measure CP-1 contains actions to ensure equitable outcomes of this job creation, such as implementing retraining programs and outreach for underrepresented communities. Actions CP-1.1 and CP-1.2 will create a Green Technology incubator to understand how anticipated growth—particularly ones spurred by transformative climate investments—can create employment opportunities that connect with historically underrepresented, under-served and under-resourced members of the community.

Actions CP-1.3, CP-1.4, CP-1.5, and CP-1.6 work together to facilitate the training and help the development of a local green workforce. Workforce development ensures and expands employability by aligning skills of employees with business needs and labor market trends. These workforce development initiatives need to be holistic and take form multiple ways which is why the City has actions to include apprenticeship programs, targeted development programs, and funding incentives. Coordination among business and education communities, labor and trade groups as well as the local and regional governments will ensure sound delivery of workforce development initiatives. Being proactive in developing a green workforce is particularly important in Santa Barbara where it is difficult to attract and retain talent due to the region's high costs for housing.