



**CHICO**  
**CLIMATE ACTION COMMISSION**  
**REGULAR MEETING AGENDA**  
**THURSDAY, DECEMBER 10, 2020 - 6:00 P.M.**  
MUNICIPAL CENTER – 421 MAIN STREET – COUNCIL CHAMBERS

# Chico

## CLIMATE ACTION COMMISSION

Cheri Chastain, Chair  
Mark Stemen, Vice Chair  
David Donnan  
Kirk Monfort  
Michael Nelson  
Rebekah Casey  
Vacant

**Copies of this agenda  
available from:**  
Community Development Department  
411 Main Street, 2<sup>nd</sup> Floor  
Chico, CA 95928  
(530) 879-6800

Or

[www.chico.ca.us](http://www.chico.ca.us)

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**Posted:** December 3rd, 2020  
**Prior to:** 5:00 p.m.

*The Commission appreciates your cooperation in turning off all cell phones during this meeting.*

### City Staff

Brendan Vieg – Community Development Director  
Molly Marcussen – Associate Planner



Please contact the City Clerk at (530) 896-7250 should you require an agenda in an alternative format or if you need to request a disability-related modification or accommodation in order to participate in a meeting. This request should be received at least three working days prior to the meeting in order to accommodate your request.

## Information and Procedures Concerning Climate Action Commission Meetings

### Public Participation:

All members of the public may address the Climate Action Commission on any item listed on the agenda. Public participation in the hearing process is encouraged.

Please step up to the podium microphone when addressing the Commission.

Each speaker will be asked to voluntarily state his/her name before speaking, and after speaking to voluntarily write his/her name on a record to be maintained by the City Staff.

The Commission and City staff will ensure order and decorum during all Commission meetings. Persons demonstrating rude, boisterous or profane behavior will be called to order by the Chair. If such conduct continues, the Chair may call a recess, requesting the removal of such person(s) from the Council Chamber, adjourn the meeting or take other appropriate action.

### Time Limit:

Presentations should be limited to a maximum of three (3) minutes, unless otherwise determined by the Chair.

A speaker may not defer his/her time to other speakers.

Groups or organizations are encouraged to select a spokesperson to speak on their behalf. Each subsequent speaker is encouraged to submit new information, rather than repeating comments made by prior speakers.

### Written Material:

The Climate Action Commission may not have sufficient time to fully review written materials presented at the public hearing. Interested parties are encouraged to provide written materials at least eight (8) days prior to the public hearing to allow distribution with the Climate Action Commission's agenda packet to provide adequate time for review by the Climate Action Commission. Written materials submitted in advance of the public hearing must be submitted to the City of Chico, Community Development Department, 411 Main Street, 2<sup>nd</sup> Floor, or by mail to: P. O. Box 3420, Chico, CA 95927. Materials related to an item on this agenda submitted to the Climate Action Commission after distribution of the agenda packet are available for public inspection in the Community Development Department at 411 Main Street, 2<sup>nd</sup> Floor, Chico, CA 95928 during normal business hours.

### Hearing Impaired:

Anyone who has difficulty hearing the proceedings of a meeting may be provided with a portable listening device by requesting one from the City Staff. The device works directly from the public-address system, and the listener can hear all speakers who are using a microphone.

### Special Presentations:

Special presentations which include slides, films, etc. during the course of a meeting will only be allowed with **prior** approval of the Climate Action Commission.

### Business from the Floor:

The Chair will invite anyone in the audience wishing to speak to the Climate Action Commission to identify themselves and the matter

they wish to discuss which would involve matters not already on the posted agenda.

The Commission may also be direct that a matter be placed on a future agenda, provide direction to staff, or request that staff research a particular issue. No action may be taken until a subsequent meeting.

### Agenda Copies are:

-Available at the meeting.

-May be mailed by subscription, at an annual cost set forth in the City of Chico Fee Schedule.

-May be picked up the Friday prior to the meeting at the Community Development Department without charge.

-Available on the internet at [www.chico.ca.us](http://www.chico.ca.us)

### Copies of Agenda Reports are:

-Available for public inspection at City of Chico Community Development Department the Friday prior to the meeting.

-Copies may be obtained after payment of applicable copy fees.

### Agenda Items:

The agenda items will be considered in the order listed unless the Commission requests a change. In order that all items may be considered, any item may be continued to another meeting if it appears there will be insufficient time for full consideration of the item.

### Items Not Appearing on Posted Agenda:

This agenda was posted on the Council Chamber bulletin board at least 72 hours in advance of this meeting. For each item not appearing on the posted agenda, upon which the Climate Action Commission wishes to take action, the Commission must make one of the following determinations:

1. Determine by a majority vote that an emergency exists as defined in Government Code Sec. 54956.5.
2. Determine by a two-thirds vote, or by a unanimous vote if less than two-thirds of the Climate Action Commission is present, that need to take immediate action and that the need for action came to the attention of the City subsequent to the agenda being posted.

### Use of Cell Phones During Meetings:

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### Appeal of Climate Action Commission Decision:

Any aggrieved person or persons dissatisfied with a Climate Action *Commission* decision may appeal that decision to the City Council within 10 calendar days. In accordance with Government Code Section 65009, if any person(s) challenges the action of the Climate Action *Commission*, said person(s) may be limited to raising only those issues that were raised at the public hearing described in this notice, or in written correspondence delivered to the Climate Action *Commission* at, or prior to, the public hearing.

**CITY OF CHICO**  
**CLIMATE ACTION COMMISSION**  
**REGULAR MEETING OF THURSDAY, DECEMBER 10, 2020**  
Municipal Center - 421 Main Street - Council Chambers - 6:00 pm

**PUBLIC PARTICIPATION:** *This meeting is being conducted in accordance with Executive Order N-29-20. Members of the public may virtually attend the meeting using the City’s WebEx platform or by sending an email to the following email address.*

To provide email comments, please submit an email with the subject line “PUBLIC COMMENT ITEM”, sent to [climatepubliccomments@chicoca.gov](mailto:climatepubliccomments@chicoca.gov) during the meeting, prior to the close of public comment on an item. The public is encouraged not to send more than one email per item and not to comment on numerous items in one email.

WebEx public participants may use the following information to remotely view and participate in the Climate Action Commission meeting online:

**Event Name:** Climate Action Commission meeting

**Date/Time:** Thursday, December 10, 2020, at 6:00 PM

**Event URL:** <https://chico.webex.com/chico/onstage/g.php?MTID=e7a6c4d134ef77fb17bac02fab790476b>

**Event #:** 146 596 6730

**Password:** Climate2020!

**Call-in #:** 1-214-459-3653      **Call-in Password:** 146 596 6730

**1. CALL TO ORDER**

1.1. Roll Call

**2. CONSENT AGENDA**

*All matters listed under the Consent Agenda are considered routine and will be enacted by one motion. There will be no separate discussion of these items unless requested by a member of the Climate Action Commission. A member of the public may request that an item be removed, provided the item does not relate to a noticed hearing which has been closed to further public comment. **Items removed from the Consent Agenda will be considered immediately following the approval of the Consent Agenda.***

**2.1. Approval of Minutes**

November 12th, 2020 (Attachment A)

**3. ITEMS TO BE DISCUSSED**

**3.1. Virtual Community Outreach Update**

Rincon Consultants will provide an update on the community outreach event that is taking place.

**3.2. Measure Quantification Discussion**

Rincon Consultants will lead a discussion on the Draft Climate Action Plan Update Measure Quantification Appendix (**Attachment B**).

**3.3. CivicSpark Initiative Update**

CivicSpark Fellow Austin Powell will provide the commission with an update regarding the effort to develop long-term strategies for mitigating anticipated local impacts of climate change congruent with SB 379.

**4. BUSINESS FROM THE FLOOR/PUBLIC COMMENT**

*Members of the public may address the Commission at this time on any matter not already listed on the agenda, with comments being limited to three minutes. The Commission cannot take any action at this meeting on requests made under this section of the agenda.*

**5. REPORTS & COMMUNICATIONS**

*These items are provided for the Commission 's information. Although the Commission may discuss the items, no action can be taken at this meeting. Should the Commission determine that action is required, the item or items may be included for action on a subsequent posted agenda.*

**6. ADJOURNMENT**

Adjourn to the Adjourned Regular Meeting of Thursday, January 14, 2020.

**CITY OF CHICO**  
**CLIMATE ACTION COMMISSION**  
**REGULAR MEETING OF THURSDAY, NOVEMBER 12, 2020**  
Municipal Center - 421 Main Street - Council Chambers - 6:00 pm

Commissioners Present: Cheri Chastain, Chair  
Mark Stemen, Vice Chair  
David Donnan  
Kirk Monfort  
Rebekah Casey  
Michael Nelson

Commissioners Absent: None

Staff Members Present: Brendan Vieg, CDD Director  
Molly Marcussen, Associate Planner  
Austin Powell, CivicSpark Fellow

**1. CALL TO ORDER**

**1.1. Roll Call**

Commissioners and staff were present as noted above.

**2. CONSENT AGENDA**

*All matters listed under the Consent Agenda are considered routine and will be enacted by one motion. There will be no separate discussion of these items unless requested by a member of the Climate Action Commission. A member of the public may request that an item be removed, provided the item does not relate to a noticed hearing which has been closed to further public comment. **Items removed from the Consent Agenda will be considered immediately following the approval of the Consent Agenda.***

**2.1. Approval of Minutes**

Commissioner Nelson made a motion to approve the October 8<sup>th</sup>, 2020 meeting minutes.

Commissioner Stemen seconded. **Minutes approved 6-0-0.**

**3. ITEMS TO BE DISCUSSED**

**3.1. Virtual Community Outreach Discussion**

Rincon Consultants led a discussion and solicited feedback on the virtual community outreach event scheduled from November 19<sup>th</sup> through December 3<sup>rd</sup>.

**4. BUSINESS FROM THE FLOOR/PUBLIC COMMENT**

*None*

**5. REPORTS & COMMUNICATIONS**

Associate Planner Molly Marcussen informed the Commission that the Biennial Recruitment for City Boards and Commissions opened on November 5th. The Climate Action Commission has four regular seats with a

term of 4-years each and one vacant position with two years remaining on the term to be filled by the new Council. The recruitment period closes on December 4th at 5:00 PM.

**6. ADJOURNMENT**

Adjourn to the Adjourned Regular Meeting of Thursday, December 10, 2020.



# City of Chico Climate Action Plan Update

## Appendix B – CAP Measures Technical Evidence

*prepared for*

**City of Chico**

411 Main Street  
Chico, California 95928

*prepared with the assistance of*

**Rincon Consultants, Inc.**

4825 J Street, Suite 200  
Chico, California 95819



**RINCON CONSULTANTS, INC.**

Environmental Scientists | Planners | Engineers

[rinconconsultants.com](http://rinconconsultants.com)

**September 2020**



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# 1 Introduction

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This document presents the technical quantification and evidence supporting the greenhouse gas (GHG) emission reduction potential of the City of Chico’s Climate Action Plan (CAP) Update. Section 15183.5(b)(1) of the CEQA guidelines establishes several criteria which must be met in order to allow for CEQA streamlining and to be considered a “qualified GHG reduction plan”. This document provides the information substantiating the GHG reductions identified for the CAP measures pursuant to Subsection (D) 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.”

As part of the CAP Update process, the City of Chico – in coordination with Rincon Consultants, Inc. (Rincon), the Chico Climate Action Commission and the community of Chico – has developed a comprehensive strategy for reducing community-wide GHG emissions over time. The strategy is organized around three levels which include:

1. **Sectors:** Sectors define the category in which the GHG reductions will take place and include Energy, Transportation, Waste, Sequestration, Water, and Outreach and Education
2. **Measures:** Measures define core strategies within each sector that will result in substantial reductions in GHG emissions
3. **Actions:** Each measure is driven by sets of actions that together support the GHG reductions necessary to achieve the City’s targets

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

- **Quantitative:** These measures and actions are supported by case studies, scientific articles, calculations, or other third-party substantial evidence that demonstrate that the implementation of said measure/action will have a measurable GHG reduction when implemented. Quantitative measures/actions can be summed to quantify how the City of Chico will meet its 2030 target and show progress towards the 2045 emission target. These targets exceed the state goal set by Senate Bill 32 (SB32) of 40% below 1990 by 2030.<sup>1</sup> The GHG 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. Further, the measures and actions were developed to achieve the 2030 target established by the City of Chico and make substantial progress towards the 2045 target. The estimates and underlying calculations, provided in this report, include the substantial evidence and a transparent approach to achieving the City’s GHG emissions reduction target.
- **Supportive:** These 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, potential for double-counting, or simply a high level of difficulty in quantifying accurate GHG reductions – they have not been

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<sup>1</sup> The Association of Environmental Professionals recommends limiting CEQA GHG Analysis to the State GHG Planning Horizon based on a State Legislatively Mandated Target (i.e., SB 32). Therefore at this time, it is recommended that cities demonstrate quantitatively how they plan to achieve GHG reductions that align with SB 32, but are not required to do the same for the 2045 carbon neutrality goal established by EO-B-55-18, as this goal has not yet been adopted by the State Legislature. Rather, it is recommended that cities demonstrate “substantial progress” towards the 2045 carbon neutrality goal. See *Final White Paper Beyond 2020 and Newhall: A Field Guide to New CEQA Greenhouse Gas Thresholds and Climate Action Plan Targets for California* (Association of Environmental Professionals, 2016).

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.

Together, the quantitative and supportive measures and actions listed herein provide Chico with the GHG reduction necessary to achieve their target of reducing per capita emissions by 80% below 1990 levels by 2030 to an estimated 2.7 MT CO<sub>2</sub>e per person. Based on current population projections this per capita target translates to a 46% reduction below 1990 GHG emission reduction levels by 2030, exceeding the requirements of SB32.<sup>2</sup> The use of per capita emission targets is called for in the 2017 Scoping Plan Update provided by the California Air Resources Board.<sup>3</sup> The City has also established a target consistent with Executive Order (EO) B-55-18 to achieve carbon neutrality by 2045.<sup>4</sup> The measures identified in this CAP will lead to a significant reduction in GHG emissions by 2045, providing a foundation for achieving net carbon neutrality. However, the 2045 GHG emissions reductions quantified in this CAP are not yet enough to meet the long term 2045 goal. Achieving carbon neutrality will require significant changes to the technology and systems currently in place. This CAP aims to establish new systems that are resilient and equitable in the face of change and that will allow for a transition to carbon neutrality in the future. This includes electrification of building and transportation systems, an increased shift to shared and active mobility, carbon neutral electricity, increased water use efficiency, and waste reduction and diversion. As the current 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 continue providing updated regulations and support once the 2030 target is achieved. Future CAP updates will outline new measures needed to reach Chico's long-term target of carbon neutrality.<sup>5</sup>

The quantification in this report is intended to illustrate one of several viable paths to pursue as the measures and actions of the CAP are implemented at full scale. 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 found to not be on target to reach the GHG reduction levels specified here for meeting SB 32 targets, the CAP as a whole or specific measures and actions will be required to be amended and a CAP update will be prepared that includes altered or additional measures and actions and evidence that upon implementation can achieve the City's targets.

Avoiding interference with and making substantial progress toward the state's 2030 and long-term goals is important as these have been set at levels that achieve California's fair share of international emissions reduction targets established by the Paris Agreement and the International Panel on Climate Change that will stabilize global climate change effects and avoid the adverse environmental consequences described under EO B-55-18 Section 3.1.3, Potential Effects of Climate Change.

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<sup>2</sup> The percent reduction target is calculated as a reduction in projected absolute emissions from 1990 levels. However, total projected emissions, emission targets, and emission reductions in 2030 and 2045 are dependent on population levels and the targets established in this CAP are efficiency targets. Therefore, while absolute emissions in 2030 and 2045 may differ due to differences between the projected population and actual population, per capita emission targets and per capita emissions reductions will remain stable.

<sup>3</sup> [https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping\\_plan\\_2017.pdf](https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf)

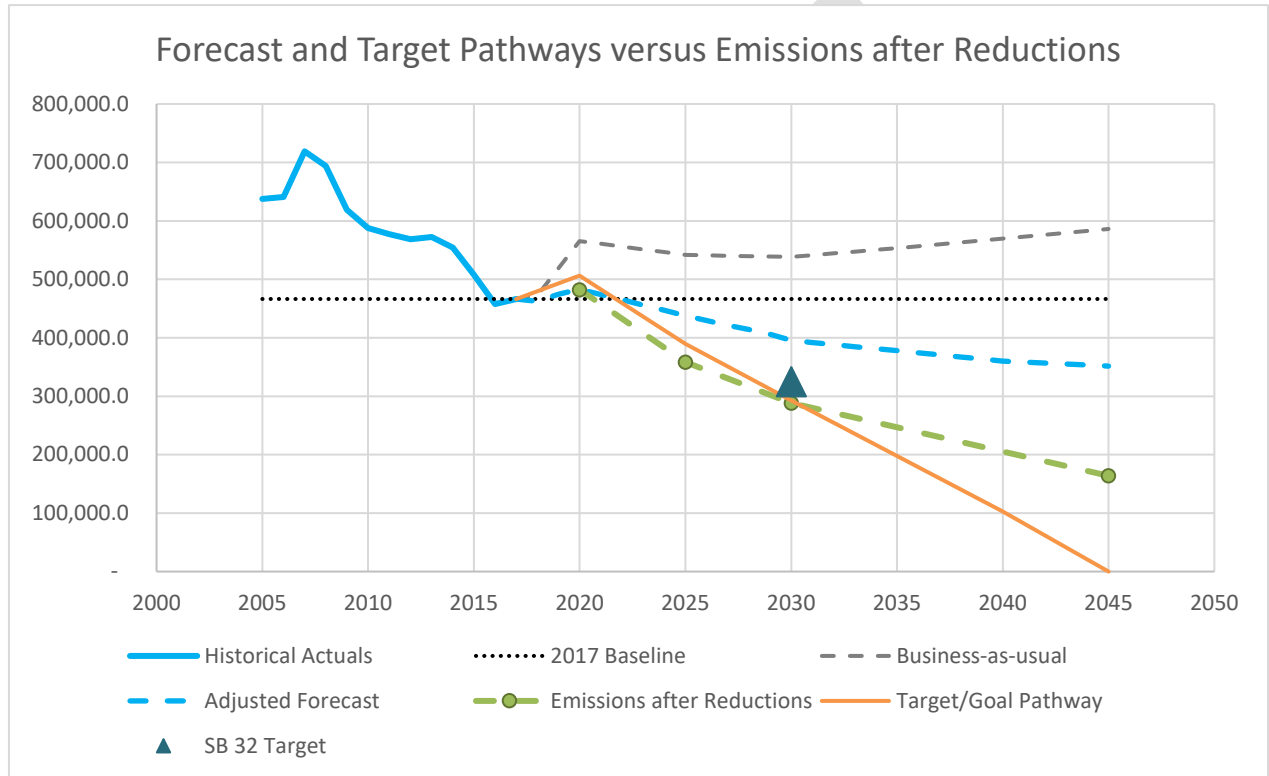
<sup>4</sup> The goal of carbon neutrality is also consistent with the Paris Agreement and the International Panel on Climate Change's target of carbon neutrality by mid-century.

<sup>5</sup> Association of Environmental Professionals, 2016.

## 2 Emission Reduction Summary

The measures and actions established by Chico’s CAP Update are expected to reduce per capita emissions below 1990 levels by 80% in 2030 and 90% in 2045. The reductions expected in 2030 exceed the requirements of SB32, but reductions expected in 2045 fall short of the carbon neutrality goal established by EO B-55-18 (Figure 1). However, as described above, this climate action plan puts Chico on the pathway to achieve carbon neutrality by 2045.

**Figure 1 Estimated Emission Reductions**



A breakdown of the emission reductions calculated for each measure is included in Table 1. A complete description of each measure and its contributing actions is included in the sections that follow.

**Table 1 Estimated Emission Reduction Potential of CAP Measures**

Measure #	Measure	2030 Emission Reduction (MT CO <sub>2</sub> e)	2045 Emission Reduction (MT CO <sub>2</sub> e)
<b>Energy</b>			
E-1	Eliminate natural gas in all new building construction by 2025 to reduce natural gas 8% by 2030 and 18% by 2045	8,970	21,760
E-2	Electrify existing buildings to reduce natural gas 19% by 2030 and 42% by 2045	21,070	50,420
E-3	Decarbonize electricity prior to 2025 to reduce electricity emissions 90% by 2030	39,170	0
E-4	Increase generation and storage of local renewable energy	Supportive	Supportive
<b>Transportation</b>			
T-1	Improve active transportation infrastructure to achieve greater than 6% mode shift away from passenger vehicles by 2030 and 2045	1,530	1,500
T-2	Improve ZEV infrastructure to achieve greater than 25% shift to ZEVs by 2030, and 90% by 2045	27,340	105,496
T-3	Improve shared mobility and transit programs and infrastructure	Supportive	Supportive
T-4	Implement parking and curb management procedures that support the mode shift goals of the overall transportation strategy	Supportive	Supportive
T-5	Support sustainable infill development to reduce VMT	Supportive	Supportive
<b>Waste</b>			
W-1	Update waste hauler contracts to implement the requirements of SB 1383 and achieve 75% reduction in organic waste by 2025	7,690	7,690
<b>Sequestration</b>			
S-1	Increase carbon sequestration by increasing urban canopy cover at least 10% by 2030 through new greenscaping programs	260	260
<b>Water</b>			
W-1	Promote and support water conservation within the community	Supportive	Supportive
<b>Outreach and Education</b>			
O-1	Conduct a wholistic community outreach and education program to optimize CAP implementation	Supportive	Supportive
<b>Overall Reductions</b>			
<b>Total Reduction Needed to Meet Target</b>		<b>102,880</b>	<b>257,386</b>
<b>Estimated Reductions Achieved by Full Implementation of Measures</b>		<b>106,030</b>	<b>187,680</b>
<b>Absolute Emission Reductions from 1990 (%)<sup>6</sup></b>		<b>-47%</b>	<b>-70%</b>
<b>Per Capita Emission Reductions from 1990 (%)</b>		<b>-80%</b>	<b>-90%</b>

<sup>6</sup> Absolute emissions reduction values are estimated based on current population projections and are for reference. Actual progress toward the 2030 target will be determined by comparison to the per capita GHG emissions target of 2.7 MT of CO<sub>2</sub>e per person pursuant to the 2017 Scoping Plan Guidelines.

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**Gap to Target**
**(3,150)<sup>7</sup>****117,146**


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Note: Quantitative emission reduction values were rounded to the nearest tenth to reflect the level of estimation involved in calculations.

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As shown in Table 1, the measures adopted in Chico’s CAP Update have the ability when fully implemented to reduce GHG emissions below the City of Chico’s GHG reduction target in 2030. However, a gap still remains to reach the goal of carbon neutrality in 2045. As new technologies develop, and the state consolidates around the 2045 carbon neutrality goal, the City of Chico will monitor progress and adopt new strategies to achieve this long-term goal. Furthermore, the measures and actions in this CAP will create the basis for long-term carbon neutrality when implemented, including electrified buildings and vehicles coupled with decarbonized electricity, improved active transportation, decreased water usage and waste generation, and increased carbon sequestration.

The following sections contain the substation evidence and quantification methodology intended to provide reasonable assurance that the GHG reduction strategy adopted in the City of Chico’s CAP Update will lead to the emission reductions necessary to achieve the City’s ambitious 2030 emission target.

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<sup>7</sup> Parenthesis denote a negative number. The measures and actions at full implementation are estimated to exceed the required reduction to achieve 2.7 MT CO<sub>2</sub>e per person by approximately 3,175 MT CO<sub>2</sub>e in 2030.

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## 3 Energy

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In order for Chico to reach its 2030 reduction target and 2045 carbon neutrality target, the majority of energy utilized by buildings in the City will need to be carbon neutral. The focusing strategy for the energy measures is electrification. All-electric buildings are powered 100% by electricity and when coupled with carbon free electricity generation become carbon neutral. Based on this strategy, the CAP's energy measures consist of the following:

- Measure E-1: Eliminate natural gas in all-new building construction by 2025 to reduce natural gas 8% by 2030 and 18% by 2045
- Measure E-2: Electrify existing buildings to reduce natural gas consumption 19% by 2030 and 42% by 2045
- Measure E-3: Decarbonize electricity prior to 2025 to reduce electricity emissions 90% by 2030
- Measure E-4: Increase generation and storage of local renewable energy

Chico's building stock currently relies heavily on natural gas and retrofitting existing buildings to be all-electric will be a substantial task. To ensure new buildings won't need to be retrofitted later, Measure E-1 will require new buildings and major retrofits be built to utilize only electricity as an energy sources through an electrification ordinance. Meanwhile, Measure E-2 will provide a framework of updated regulations, incentives, rebates, and outreach to drive the electrification of existing buildings. Senate Bill 100 (SB 100) requires all electricity providers in the state to provide carbon neutral electricity by 2045 which will also allow the operation of electrified buildings to become carbon neutral by 2045. Procuring community-wide carbon-free electricity through a Community Choice Aggregation (CCA) can expedite that timeline and offer significant GHG reductions in the short term. To fully optimize the GHG reduction benefits of E-1 and E-2, Measure E-3 directs the City to procure carbon neutral electricity through the Butte Choice Energy Community Choice Aggregation, decreasing community-wide electricity emissions to almost zero well before 2045. Measures E-1 and E-2 will increase electricity demand on the grid into the future. To compensate for this, and increase Chico's energy resiliency overall, Measure E-4 will support local energy generation and storage projects. The details of each energy measure, including their supporting actions and evidence of their GHG reduction potential, are included below.



## Measure E-1: Eliminate natural gas in all-new building construction by 2025 to reduce natural gas 8% by 2030 and 18% by 2045

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Require new construction to be all-electric:</b> Adopt a new building ordinance which bans the installation of natural gas in new residential construction by 2023 and in new commercial construction by 2024. The ordinance will only apply for building types where electrification is shown to be cost-effective.	2030: 8,973 2045: 21,760

### *Action 1: Require new construction to be all-electric*

Continuing to allow natural gas in new buildings would result in an increase in GHG emissions through 2045, due to increases in the population and residential construction in the City projected through 2045 (see adjusted forecast in Appendix A). Conversely, GHG emissions from electricity generation are expected to decrease to almost zero by 2024 due to Measure E-3 (emissions from electricity would otherwise decrease to zero in 2045, due to SB 100). Requiring new construction to be all-electric would lead to a mandatory reduction in natural gas consumption compared to adjusted forecast projections by replacing natural gas with electricity.

Emission reductions for Action 1 were calculated separately for residential and commercial construction, as the ordinance would be implemented for each in different years. It was assumed that with full implementation of the ordinance, no increases in residential natural gas demand would occur after 2023 and no increases in commercial natural gas demand would occur after 2024. Natural gas saved after ordinance implementation was converted to electricity usage (i.e., therms converted to kWh), with the assumption that a modern electric heat pump is on average three times more efficient than natural gas heater.<sup>8</sup> The emission factor for electricity was calculated based on the assumption that Measure E-3 would be fully implemented by 2024 (more details on how this emission factor was calculated are included in the section for Measure E-3). Total emissions saved are equivalent to emissions saved from eliminating natural gas in new construction, minus emissions from increased electricity usage.

Population forecast data from BCAG reflect a large spike in population between 2017 and 2020, after which population is expected to decrease through 2030 as formerly displaced residents leave Chico (see Appendix A). The forecast for natural gas therefore mirrors this pattern, with large increases in usage through 2020 and steady decreases through 2030. While overall natural gas usage is expected to decrease between 2020 and 2030, housing is expected to increase in Chico through 2045. Residential natural gas from new construction was therefore calculated based on housing estimates from BCAG. It was also assumed that the proportion of new residential gas usage relative to total residential gas usage would be about the same in each year as new commercial gas usage to total commercial gas usage. This relationship was used to infer new commercial natural gas usage.

<sup>8</sup> <https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump->

<b>Calculations</b>		
<b>Year</b>	<b>2030</b>	<b>2045</b>
<b>Residential Reductions</b>		
Housing units <sup>1</sup>	45,314	50,784
NG usage (therms) <sup>2</sup>	14,235,786	15,309,899
NG usage per housing unit (therms per house)	314	301
Additional housing units since implementation year <sup>1</sup>	3,700	9,170
NG usage avoided (therms)	1,162,387	2,764,517
Emissions from NG usage avoided (MT CO <sub>2</sub> e) <sup>3</sup>	6,169	14,671
Electricity usage from converting to electric (kWh) <sup>4</sup>	11,352,686	27,000,211
Electricity EF (MT CO <sub>2</sub> e/kWh) <sup>5</sup>	0.0000040	-
Emissions from converted electricity usage (MT CO <sub>2</sub> e)	45	-
Emission reductions (MT CO <sub>2</sub> e)	6,124	14,671
<b>Commercial Reductions</b>		
NG usage (therms) <sup>1</sup>	6,722,232	7,396,983
NG usage avoided (therms)	548,887	1,335,677
Emissions from NG usage avoided (MT CO <sub>2</sub> e) <sup>3</sup>	2,913	7,088
Electricity usage from converting to electric (kWh) <sup>4</sup>	5,360,813	13,045,161
Electricity EF (MT CO <sub>2</sub> e/kWh) <sup>5</sup>	0.0000119	-
Emissions from converted electricity usage (MT CO <sub>2</sub> e)	64	-
Emission reductions (MT CO <sub>2</sub> e)	2,849	7,088
<b>Total Reductions (MT CO<sub>2</sub>e)</b>	<b>8,973</b>	<b>21,760</b>

<sup>1</sup> BCAG provisional long-term growth forecasts (2020)  
<sup>2</sup> Values from GHG Emissions Forecast. See Appendix A.  
<sup>3</sup> Based on an emission factor of 0.005307 MT CO<sub>2</sub>e/therm, as established in Appendix A.  
<sup>4</sup> Based on a conversion factor of 29.3001 kWh/therm and the assumption that electric appliances are generally three time more efficient than gas appliances. <https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump>  
<sup>5</sup> The residential and commercial electricity emission factors were calculated based on opt-out rates for different CCA customers. See Measure E-3 for further details on this calculation.

## Measure E-2: Electrify existing buildings to reduce natural gas consumption 19% by 2030 and 42% by 2045

Action #	Action	Anticipated Reduction (MT CO2e)
1	<p><b>Electrify existing residential buildings:</b> Adopt an electrification ordinance for existing residential buildings to transition natural gas to electric in two phases, to be implemented through the building permit process:</p> <ul style="list-style-type: none"> <li>▪ Phase I: Limit expansion of natural gas lines in existing buildings by 2023</li> <li>▪ Phase II: Require HVAC system replacements and hot water heaters replacements to be all-electric by 2025</li> </ul>	2030: 20,615
2	<p><b>Update RECO to support electrification:</b> Amend the Residential Energy Conservation Ordinance (RECO), Title 16 of the Municipal Code, to require electrification and/or energy conservation improvements for substantial remodels (over 50%) or upon transfer/sale of homes and apartments. RECO will be amended to include electrification options such as installation of a 200 amp panel and electric heat pump appliances, HVAC, and hot water heaters, to go beyond the base requirements for energy conservation set forth in the California Code of Regulations Title 24, Part 6.</p>	2045: 49,268
3	<p><b>Electrify municipal buildings:</b> Adopt an electrification plan to convert municipal buildings to all-electric by 2045. This plan would include a new building electrification policy as well as an existing building natural gas phase-out policy.</p>	2030: 460 2045: 1,149
4	<p><b>Perform an electrification feasibility study:</b> Conduct a feasibility study/existing building analysis to understand the costs associated with electrifying existing residential and commercial buildings in the City of Chico.</p>	Supportive
5	<p><b>Track electrification progress:</b> Develop a permit tracking program for existing building electrification to track annual progress in achieving the City's electrification goals.</p>	Supportive
6	<p><b>Identify and partner with stakeholders to conduct electrification outreach, promotion, and education:</b> Leverage partnerships with stakeholders to conduct outreach, promotion, and education around new and existing building electrification, including:</p> <ul style="list-style-type: none"> <li>▪ Induction/electric stove cooking competition to demonstrate the competitiveness of electric stoves for replacing gas stoves</li> <li>▪ Information sessions/events that educate the public on safety concerns around gas stoves and health/cost benefits of replacing water heaters and space heaters with electric heat pumps</li> <li>▪ Develop financial and technical resources, including hosting workforce development trainings for installers and building owners/operators to discuss benefits and technical requirements of electrification and move towards all-electric requirements</li> <li>▪ Conduct internal trainings with planners and building officials on state decarbonization goals and incentives available for electric homes</li> <li>▪ Establish a comprehensive, coordinated electrification education campaign for property owners and occupants, including an updated list of rebates and incentives available for residents wanting to electrify their homes</li> </ul>	Supportive

Action #	Action	Anticipated Reduction (MT CO2e)
7	<p><b>Identify and partner with stakeholders to develop resident-level funding pathways for implementing electrification ordinance:</b> Leverage partnerships with stakeholders and establish funding pathways to ease community members’ costs when complying with the electrification ordinance, including:</p> <ul style="list-style-type: none"> <li>▪ Pass a transfer tax ordinance and provide a rebate for electric panels and/or other upgrades</li> <li>▪ Partner with PG&amp;E, Butte Choice Energy, and/or other stakeholders to create or expand electrification/retrofit programs and incentives, especially for low-income residents. These could include the PACE program, PG&amp;E’s low-income weatherization program, tariffed on-bill financing, metered energy efficiency, or others.</li> </ul>	Supportive

*Actions 1 & 2: Electrify existing Residential buildings & update RECO to support electrification*

Actions 1 and 2 were quantified together for simplicity and to avoid double counting. Natural gas usage from existing buildings accounted for about 20% of emissions in Chico in 2017. While the City is limited in its ability to require whole-building all-electric retrofits, the City can adjust the building permitting process to limit natural gas line expansion and ensure that natural gas appliances such as hot water heaters and space heaters are replaced with electric appliances at time-of-replacement (Action 1) or during major retrofits or at time-of-sale (Action 2). Approximately 34% of residential natural gas usage is used for water heaters, while 40% is used for space heating.<sup>9</sup> The average life-span for water heaters and HVAC systems is 10 years and 18 years, respectively, and the ordinance would be fully implemented by 2025.<sup>10</sup> Action 1 would require the City of Chico no longer accept permits to replace natural gas HVAC and hot water heaters starting in 2025, especially if voluntary efforts have not been successful. These units have been selected due to their large contribution to natural gas use and their cost effectiveness.<sup>11</sup> Based on a 2025 implementation date and the assumed life span of the covered equipment natural gas usage in existing buildings should decrease 30% by 2030, and 74% by 2045. This timeline would be expedited along the way by Action 2, which updates RECO to encourage electrification at time-of-retrofit or at time-of-sale. Based on data provided by the Sierra North Valley Realtors, approximately 4% of homes in Chico are sold annually, though this number can fluctuate between years.

Similar to calculations used for Measure E-1, avoided natural gas usage was assumed to be replaced by additional electricity usage, and electric appliances were assumed to be three times more efficient than their natural gas counterparts. The emission factor for electricity is assumed to be consistent with Measure E-3.

Calculations		
Year	2030	2045
Residential NG usage (therms) <sup>1</sup>	14,235,786	15,309,899

<sup>9</sup> <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

<sup>10</sup> <https://www.lowes.com/n/how-to/when-to-replace-a-water-heater>

<https://www.thisoldhouse.com/ideas/how-long-things-last>

<sup>11</sup> [https://www.ethree.com/wp-content/uploads/2019/04/E3\\_Residential\\_Building\\_Electrification\\_in\\_California\\_April\\_2019.pdf](https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf)

Residential NG usage after new building electrification is implemented (therms) <sup>2</sup>	13,073,399	12,545,382
Percentage of homes with replaced water heaters <sup>3</sup>	52%	100%
NG reduction from water heater replacement (%) <sup>4</sup>	18%	34%
NG saved from water heater replacement (therms)	2,310,685	4,265,430
Percentage of homes with replaced HVAC <sup>5</sup>	31%	100%
NG reduction from HVAC replacement (%) <sup>6</sup>	12%	40%
NG saved from HVAC replacement (therms)	1,602,494	5,018,153
Total NG saved (therms)	3,913,179	9,283,583
Emissions from total NG saved (MT CO <sub>2</sub> e) <sup>7</sup>	20,767	49,268
Electricity usage from converting to electric (kWh) <sup>8</sup>	38,218,841	90,669,967
Electricity EF (MT CO <sub>2</sub> e/kWh) <sup>9</sup>	0.0000040	-
Emissions from converted electricity usage (MT CO <sub>2</sub> e)	152	-
<b>Total Reductions (MT CO<sub>2</sub>e)</b>	<b>20,615</b>	<b>49,268</b>

<sup>1</sup> Values from forecast. See Appendix A.

<sup>2</sup> Forecasted natural gas minus natural gas lost to new building electrification

<sup>3</sup> Assume 100% of homes replace their water heaters 10 years after ordinance is first passed, with 4% of homes replacing each year as they are sold and the remaining 96% replacing incrementally with each year. Based on average water heater lifetime of 10 years. <https://www.lowes.com/n/how-to/when-to-replace-a-water-heater>. 4% sale rate based on data provided by the Sierra North Valley Realtors.

<sup>4</sup> Assume 34% of natural gas usage goes to water heaters. <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>. Multiply by percentage of homes with replaced water heaters to derive total percentage of natural gas reduction from water heater replacement.

<sup>5</sup> Assume 100% of homes replace their HVAC 18 years after ordinance is first passed, with 4% of homes replacing each year as they are sold and the remaining 96% replacing incrementally with each year. Based on average HVAC lifetime of 18 years.

<https://www.thisoldhouse.com/ideas/how-long-things-last>. 4% sale rate based on data provided by the Sierra North Valley Realtors.

<sup>6</sup> Assume 40% of natural gas usage goes to heating/cooling. <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>. Multiply by percentage of homes with replaced water heaters to derive total percentage of natural gas reduction from HVAC replacement.

<sup>7</sup> Based on an emission factor of 0.005307 MT CO<sub>2</sub>e/therm, as established in Appendix A.

<sup>8</sup> Based on a conversion factor of 29.3001 kWh/therm and the assumption that electric appliances are generally three time more efficient than gas appliances. <https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump->

<sup>9</sup> The residential electricity emission factor was calculated based on opt-out rates for different CCA customers. See Measure E-3 for further details on this calculation.

### Action 3: Electrify municipal buildings

This action commits the City of Chico to electrifying the buildings it owns and operates by 2045. Annual natural gas usage for all municipal buildings was provided by the City for 2018 and assumed to be approximately consistent from year to year, as no major expansions or reductions are planned. The electricity emission factor was estimated to be zero in 2030 and 2045 due to implementation of the CCA

with 100% carbon-free electricity by 2024 (Measure E-3) and assuming 0% opt-out for municipal electricity accounts. Emission reductions are calculated as avoided natural gas emissions minus replacement electricity emissions, as for Actions 1 and 2.

Calculations		
Year	2030	2045
Expected NG usage (therms) <sup>1</sup>	216,490	216,490
Expected emissions (MT CO <sub>2</sub> e) <sup>2</sup>	1,149	1,149
NG reduction from electrification (%) <sup>3</sup>	40%	100%
NG saved (therms)	86,596	216,490
Emissions from NG saved (MT CO <sub>2</sub> e) <sup>2</sup>	460	1,149
Electricity usage from converting to electric <sup>4</sup>	845,757	2,114,393
Electricity EF (MT CO <sub>2</sub> e/kWh) <sup>5</sup>	-	-
Emissions from converted electricity usage (MT CO <sub>2</sub> e)	-	-
<b>Total Reductions (MT CO<sub>2</sub>e)</b>	<b>460</b>	<b>1,149</b>

<sup>1</sup> Values from forecast. See Appendix A.  
<sup>2</sup> Based on an emission factor of 0.005307 MT CO<sub>2</sub>e/therm, as established in Appendix A.  
<sup>3</sup> Assuming linear electrification progress from 0% in 2020 to 100% in 2045  
<sup>4</sup> Based on a conversion factor of 29.3001 kWh/therm and the assumption that electric appliances are generally three time more efficient than gas appliances. <https://help.leonardo-energy.org/hc/en-us/articles/203047881-How-efficient-is-a-heat-pump->  
<sup>5</sup> Assuming 0% opt-out from the CCA for municipal accounts

*Action 4: Perform an electrification feasibility study*

Performing an electrification feasibility study will support implementation of Actions 1 and 2, contributing to achieving the GHG reduction benefits of those actions. The feasibility study will help determine which buildings in Chico can be electrified, how to make electrification cost effective in specific cases, clarify the timeline on which electrification will happen, and investigate more concretely how to implement electrification equitably. A feasibility study could also investigate if and how commercial buildings in Chico could be electrified cost effectively, leading to additional GHG reduction potential not accounted for here.

*Action 5: Track electrification progress*

The best mechanism the City will have for tracking electrification progress – and accurately measuring its GHG reduction benefit as it happens – is through a permit tracking program. Tracking electrification progress on a yearly schedule will allow the City to adjust its electrification approach and respond to potential obstacles as they occur and as new information about electrification becomes available.

*Action 6: Identify and partner with stakeholders to conduct electrification outreach, promotion, and education*

The impacts associated with promotional and educational outreach for electrification have not been well documented due to the cutting-edge nature of the strategy. Electrification as a GHG reduction strategy has only begun to gain traction in California mostly due to the implementation of SB 100 and the

expansion of community choice aggregations. While it is not clear how the community will respond to electrification, energy efficiency outreach has been conducted since as early as the 1970's and some research has been conducted on the effects of outreach and education on energy. One study in New York showed that out of the 8,991 people who participated in informational programs, 69% implemented the recommended practices.<sup>12</sup> Another research meta-analysis reviewed dozens of papers covering various energy efficiency, water efficiency, and waste outreach and found that education-only campaigns could produce between 10-12% energy savings.<sup>13</sup>

Electrification is a new idea and not well understood by the community. The education associated with this action as well as the Climate Action Plan itself will facilitate adoption of all-electric technologies. The City will conduct a CAP update between 3 and 5 years to check progress and adopt more voluntary or potentially mandatory measures if necessary. Due to the indirect causal link between education and community-wide action, this measure is not quantified but considered supportive to the overall measure.

*Action 7: Identify and partner with stakeholders to develop resident-level funding pathways for implementing electrification ordinance*

This action would focus on building the funding pathway to make existing building electrification (Actions 1 and 2) possible, particularly for low-income residents of Chico. The largest barrier to existing building electrification is higher up-front capital costs compared to natural gas.<sup>14</sup> Utility-offered incentives to offset these costs for the end-user are therefore among the most promising opportunities for updating this technology.<sup>15</sup> Once up-front costs are financed, long term savings can be used to achieve cash flow positive retrofits and/or acceptable ROI's. Demonstrating cost effective pathways for existing building electrification will be a key step before mandatory requirements can be set. Examples of funding/financing strategies include:

**Low-income electrification/retrofit programs:** Electrification programs that target low-income residents are the most cost-effective and potentially successful approach for equitable decarbonization to combat climate change.<sup>16</sup> For example, the Low-Income Weatherization Program (LIWP) is the state's first energy efficiency program that targets low-income Californians and has reduced energy bills in participating multifamily buildings by 30% and overall energy usage by an average of 40%.<sup>17</sup> A case study on a major energy retrofit in a Lancaster 100-unit low income multifamily complex resulted in a one-third reduction in natural gas use (approximately 145 therms per apartment).<sup>18</sup> The study also showed that such retrofits can result in increased tenant retention, improved health and comfort, and better ability to afford necessities like food, medicine, health care, and rent.

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<sup>12</sup> [https://www.ioe.org/joe/2009december/pdf/JOE\\_v47\\_6a6.pdf](https://www.ioe.org/joe/2009december/pdf/JOE_v47_6a6.pdf)

<sup>13</sup> [https://aceee.org/files/proceedings/2000/data/papers/SS00\\_Panel8\\_Paper10.pdf](https://aceee.org/files/proceedings/2000/data/papers/SS00_Panel8_Paper10.pdf)

<sup>14</sup> California Center for Sustainable Energy. 2009. Solar Water Heating Pilot Program: Interim Evaluation Report.

[https://www.ethree.com/wp-content/uploads/2019/04/E3\\_Residential\\_Building\\_Electrification\\_in\\_California\\_April\\_2019.pdf](https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf)

<sup>15</sup> <https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf>

<sup>16</sup> [http://greenlining.org/wp-content/uploads/2019/10/Greenlining\\_EquitableElectrification\\_Report\\_2019\\_WEB.pdf](http://greenlining.org/wp-content/uploads/2019/10/Greenlining_EquitableElectrification_Report_2019_WEB.pdf)

<sup>17</sup> California Housing Partnership Corporation and Association for Energy Affordability (2018). California's Cap-and-Trade-Funded Low Income Weatherization Program Multifamily: Impact Report, 3.

<sup>18</sup> <https://ww2.energy.ca.gov/2019publications/CEC-500-2019-021/CEC-500-2019-021.pdf>

**On-bill financing:** A case study from affordable multi-family residential complexes in Santa Monica showed that electricity savings from the program ranged from 1,811-17,712 kWh and natural gas savings ranged from 914-2,567 therms, with overall energy improvement ranging from 10-35%.<sup>19</sup>

**Energy efficiency retrofit programs (e.g. PACE, PG&E's low-income weatherization program, Million Watt Challenge, metered energy efficiency):** While the use of carbon neutral electricity by 2045 due to SB100 ensures all-electric buildings have zero energy emissions, there is still a need to reduce energy consumption within Chico. Reducing energy consumption will reduce stress on the electricity grid, require less renewable energy generation to meet needs thereby saving resources, and help reduce energy bills within the community.

Action 7 is considered supportive to Actions 1 and 2 and therefore not quantified.

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<sup>19</sup> <https://1p08d91kd0c03rlxhmhtydpr-wpengine.netdna-ssl.com/wp-content/uploads/2017/03/Santa-Monica-Test-Web.pdf>



### Measure E-3: Decarbonize electricity prior to 2025 to reduce electricity emissions 90% by 2030

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Provide carbon neutral electricity to the community:</b> Procure carbon neutral electricity for the community through Butte Choice Energy Community Choice Aggregation (CCA), in accordance with the ordinance authorizing the implementation of a CCA Program through a Joint Powers Agreement with Butte County, amending Title 15 of the Municipal Code. Automatically enroll community and municipal accounts in the 100% renewable energy option by 2025 with an opt-out option.	2030: 39,169 2045: 0

#### *Action 1: Provide carbon neutral electricity to the community*

Electricity in Chico is currently supplied by PG&E, which provides a power mix with 39% renewable resources, and 89% GHG free overall (including nuclear and large hydro).<sup>20</sup> While the portion of renewables in PG&E's grid mix is relatively high compared to other utility providers in the state, the emission factor associated with its electricity is not expected to decrease to zero until the state-mandated year of 2045. In order to reduce GHG emissions in the short-term, the City will provide 100% carbon free electricity to the community through the Butte Choice Energy (BCE) Community Choice Aggregation (CCA). In general, CCAs use the purchasing power of the community to procure electricity directly from electricity generators. This allows the community to choose its own grid mix, with an option to procure electricity from 100% carbon free renewable generation sources. PG&E will continue to deliver power, maintain lines and infrastructure, and coordinate billing. By 2025, BCE is expected to provide three power mix options<sup>21</sup> for community members to choose from:

- Base RPS option with 33% renewable and 80% GHG free sourcing offered at a 2% rate savings
- 50% renewable option with 80% GHG free in 2020 and 95% GHG free in 2030 offered at a 2% rate savings
- 100% renewable option offered at a slight price premium

To maximize the GHG reduction opportunity this presents, the City will automatically enroll all community accounts in a 100% carbon free option. Customers will have the option to opt-out of the CCA back to PG&E or opt-down to another grid mix option. It is expected that about 5% of residential customers and 15% of commercial customers will choose to opt-out.<sup>22</sup> Municipal accounts will have 0% opt-out.

<sup>20</sup> [https://www.pge.com/en\\_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page?WT.mc\\_id=Vanity\\_cleanenergy](https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page?WT.mc_id=Vanity_cleanenergy)

<sup>21</sup> <https://www.buttechoiceenergy.org/what-is-cca>

<sup>22</sup> [http://buttecounty.granicus.com/MetaViewer.php?view\\_id=2&clip\\_id=512&meta\\_id=87146](http://buttecounty.granicus.com/MetaViewer.php?view_id=2&clip_id=512&meta_id=87146)



Calculations		
Year	2030	2045
Residential electricity usage (kWh) <sup>1</sup>	268,060,313	278,521,034
Commercial electricity usage (kWh) <sup>1</sup>	272,168,291	293,250,715
Municipal electricity usage (kWh) <sup>2</sup>	6,524,352	6,524,352
PG&E Electricity EF (MT CO <sub>2</sub> e/kWh) <sup>3</sup>	0.0000795	0.0000000
Emissions from electricity usage before CCA (MT CO <sub>2</sub> e)	43,481	-
CCA Electricity EF (MT CO <sub>2</sub> e/kWh) <sup>4</sup>	0.0000000	0.0000000
Weighted residential electricity EF after accounting for opt-out (MT CO <sub>2</sub> e/kWh) <sup>5</sup>	0.0000040	0.0000000
Weighted commercial electricity EF after accounting for opt-out (MT CO <sub>2</sub> e/kWh) <sup>6</sup>	0.0000119	0.0000000
Emissions from electricity usage after CCA (MT CO <sub>2</sub> e)	4,313	-
<b>Total Reductions (MT CO<sub>2</sub>e)</b>	<b>39,169</b>	<b>-</b>
<p><sup>1</sup> Values from forecast. See Appendix A. Additional electricity load expected from Measures E-1 and E-2 not included here due to CCA reductions for the added electricity being accounted for in each measure's respective quantification. Municipal electricity usage subtracted from total commercial electricity usage for independent modelling. See note 2 for details on municipal electricity usage data.</p> <p><sup>2</sup> Based on electricity data provided by the City of Chico for 2018. Municipal usage not expected to change substantially between 2020 and 2045.</p> <p><sup>3</sup> Values from forecast. See Appendix A.</p> <p><sup>4</sup> All community accounts to be automatically enrolled in 100% renewable electricity package with an opt-out option.</p> <p><sup>5</sup> Assume 5% residential account opt-out such that 5% of accounts continue to have a PG&amp;E emission factor, while 95% of accounts continue with the CCA-provided emission factor of 0 MT CO<sub>2</sub>e/kWh. Opt-out rate provided by <a href="http://buttecounty.granicus.com/MapView.php?view_id=2&amp;clip_id=512&amp;meta_id=87146">http://buttecounty.granicus.com/MapView.php?view_id=2&amp;clip_id=512&amp;meta_id=87146</a>.</p> <p><sup>6</sup> Assume 15% commercial account opt-out. Opt-out rate provided by <a href="http://buttecounty.granicus.com/MapView.php?view_id=2&amp;clip_id=512&amp;meta_id=87146">http://buttecounty.granicus.com/MapView.php?view_id=2&amp;clip_id=512&amp;meta_id=87146</a>.</p>		

## Measure E-4: Increase generation and storage of local renewable energy

Action #	Action	Anticipated Reduction (MT CO2e)
1	<b>Coordinate with stakeholders to provide local energy generation support and incentives for the community:</b> Partner with PG&E and/or other stakeholders to support and incentivize local on-site energy generation and storage resources within the community. This could include a co-located community solar and storage project.	Supportive
2	<b>Streamline battery storage requirements:</b> Coordinate City departments to establish and streamline battery storage requirements to allow for easier implementation of these technologies within the community.	Supportive
3	<b>Conduct an energy generation feasibility study:</b> Conduct a feasibility study through the PG&E Sustainable Solutions Turnkey (SST) program to assess cost and applicable locations for installation of battery back-up systems, generators, or a micro-grid throughout the City. Engage with the community to determine how local energy generation systems can support community infrastructure as well as critical public infrastructure.	Supportive
4	<b>Install renewable energy technology at municipal facilities:</b> Continue to partner with PG&E through the Sustainable Solutions Turnkey program to install renewable energy technology at municipal facilities and become a zero net energy organization across all municipal facilities. Ten potential programs have been identified including: <ul style="list-style-type: none"> <li>▪ Expanding the existing one-megawatt solar array and updating other energy infrastructure at the Water Treatment Plant</li> <li>▪ Increasing backup generation capacity and adding battery storage at City facilities</li> </ul>	Supportive

### *Action 1: Coordinate with stakeholders to provide local energy generation and storage support and incentives for the community*

This action will support the overall transition to an electrified building stock at the lowest cost and with the most resilience. Distributed local energy generation and storage, such as on-site solar and storage batteries, can be used instead of traditional transmission and distribution infrastructure upgrades to help meet the increasing demand that electrification will put on the grid. While it’s hard to know exactly how effective incentives for on-site solar and battery storage will be, current solar adoption trends in Chico indicate that these options are desirable for local business owners and homeowners alike.

Residential solar installations have demonstrated success in reducing emissions. A residential solar panel system has the capability of providing for the electricity needs of an entire home with about 80% lower carbon emissions than fossil fuels.<sup>23</sup> The largest barrier to residential solar is up-front installation costs<sup>24</sup>, suggesting that utility-provided incentives would lead to installation increases. Battery storage can greatly maximize the benefits of renewable energy systems like solar PV. A recent 2019 study from the University of Michigan found that in California as a whole, adding 60GW of renewables could achieve 72% CO<sub>2</sub> reductions with close to one third curtailment.<sup>25</sup> Adding energy storage technologies could

<sup>23</sup> [https://nature.berkeley.edu/classes/es196/projects/2013final/ArifM\\_2013.pdf](https://nature.berkeley.edu/classes/es196/projects/2013final/ArifM_2013.pdf)

<sup>24</sup> Ibid

<sup>25</sup> Curtailment occurs when more power is produced than needed at a given time, leading to energy losses

increase this to 90% reduction and only 9% curtailment, under one modeled scenario.<sup>26</sup> While industrial and commercial battery storage will drive these reductions, residential energy storage will also play an important part in the effort to increase battery storage across the state. Residential energy storage is often more flexible and resilient than larger utility-owned systems because the network is well-distributed and has buy-in from both the utility and the owners/residents.<sup>27</sup> Residential energy storage exceeded utility-scale storage installations in the U.S. in 2018, reflecting the high value customers are placing on having their own storage systems.<sup>28</sup>

#### *Action 2: Streamline battery storage requirements*

To further support battery storage installation projects in the community, the City will work to streamline battery storage requirements to reduce the development barrier for these kinds of projects. While difficult to quantify direct GHG reduction effects of this action, it will still play a key role in the overall local energy generation goals of the measure.

#### *Action 3: Conduct an energy generation feasibility study*

An energy generation feasibility study will help the City to determine where and how to build local renewable energy to benefit the community. A feasibility study will provide information on what type of energy generation technology is available, at what cost, and for what purpose. The process of developing the feasibility study will also help the City identify potential stakeholders to partner with and funding sources to use in implementing an energy generation project. This action is currently being pursued through the PG&E Sustainable Solutions Turnkey Program.

#### *Action 4: Install renewable energy technology at municipal facilities*

While difficult to directly quantify the effects of this action on community-wide emissions, this action will allow the City to do its part in providing local energy generation and storage. City-driven energy generation and storage projects help local governments and their communities achieve substantial energy, environmental, resilience, and economic benefits.<sup>29</sup> Projects like these can also indirectly reduce community emissions by creating publicity and awareness around the issue.<sup>30</sup>

The City is currently working with PG&E through the Sustainable Solutions Turnkey (SST) program to achieve energy cost reductions and environmental stewardship goals. Past projects with the SST program include a significant LED retrofit project in 2016 (estimated to save 519,725.75 kWh annually) and a preliminary energy assessment of City facilities in 2018. Ten preliminary projects have been identified to pursue through the SST program, including expanding the existing one-megawatt solar array at the wastewater treatment plant (the wastewater treatment plant accounts for 45% of electricity usage at the City), and adding backup generation capacity and battery storage. The City is also currently working on identifying paths towards potential projects to become a zero net energy organization, meaning the City would generate or offset its complete annual energy usage and would not incur any electrical utility costs. In 2019, the City moved forward with phase three of the SST program and entered into a contract

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<sup>26</sup> <http://css.umich.edu/publication/role-energy-storage-deep-decarbonization-electricity-production>

<sup>27</sup> <https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/how-residential-energy-storage-could-help-support-the-power-grid>

<sup>28</sup> Ibid

<sup>29</sup> <https://www.energy.gov/sites/prod/files/2017/02/f34/onsiterenewables508.pdf>

<sup>30</sup> <https://www.energy.gov/sites/prod/files/2017/02/f34/onsiterenewables508.pdf>

with PG&E for an investment grade audit (IGA). The IGA is an in-depth evaluation providing further calculations, implementation costs of each project, identifying eligible utility rebates and incentives, confirming energy savings, and producing 30% engineering design documents. The City will make a final decision on which of the ten identified projects to move forward on during phase four of the SST program. As part of the decision electrification and achievement of the long-term carbon neutrality target will be considered.

## 4 Transportation

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Reducing transportation emissions and becoming a carbon neutral City means reducing the number of miles driven by fossil fuel-powered vehicles, particularly passenger vehicles, which account for 98% of gasoline usage in the Butte County region.<sup>31</sup> Chico has set a target of 35% reduction in transportation fuels by 2030 and will accomplish this through the following measures:

- Measure T-1: Improve active transportation infrastructure to achieve greater than 6% mode shift away from passenger vehicles by 2030
- Measure T-2: Improve ZEV infrastructure to achieve greater than 23% shift to ZEVs by 2030, and 90% by 2045
- Measure T-3: Improve shared mobility and transit programs and infrastructure
- Measure T-4: Implement parking and curb management procedures that support the mode shift goals of the overall transportation strategy
- Measure T-5: Support sustainable infill development to reduce VMT

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, especially biking, through Measures T-1 and T-3; then electrifying to the greatest extent possible the remaining passenger vehicle trips through Measure T-2. Measures T-4 and T-5 will further maximize the effects of Measures T-1, T-2, and T-3.

To successfully achieve a greater than 6% mode shift to active transportation (Measure T-1), the City must provide low stress and convenient infrastructure and prioritize active transportation movement. Infrastructure needs including bikeways, sidewalk improvements, and expansions of both kinds of infrastructure to all areas of the City. Once the infrastructure is available and stress/comfort is not an issue, comparison with other cities around the world suggest more people will choose active transportation.

Improving shared mobility and transit programs and infrastructure through Measure T-3 will also help to shift mode share to public transit. To do this the City must work with its partners, including BCAG and Butte Regional Transit, to expand service lines and increase 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. By making transit more convenient and making decisions to prioritize transit over single occupancy vehicles Chico will begin to shift towards shared transit.

While the City cannot require its residents to buy ZEVs and electrify remaining passenger vehicle trips, Measure T-3 will ensure the infrastructure and support is present in the City to begin to remove present barriers to ZEV adoption.

Finally, Measure T-4 will help create behavior disincentives for owning a fossil fuel-powered vehicle through dynamic parking pricing, improved curbside management, and overall support for active transportation and ZEVs in place of fossil fuel-powered transportation. Measure T-5 will provide the long-term planning and development framework that will continue to make Chico as a whole highly accessible for active transportation and public transit options. The details of each transportation measure, including their supporting actions and evidence of their GHG reduction potential, are included below.

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<sup>31</sup> CARB EMFAC2017 model.

**Measure T-1: Improve active transportation infrastructure to achieve greater than 6% mode shift away from passenger vehicles by 2030**

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<p><b>Implement Chico Bicycle Master Plan:</b> Fully implement the Chico Bicycle Master Plan 2019 Update by 2030 in accordance with the Plan’s goals, objectives, and policies. Implementation of the Plan will include:</p> <ul style="list-style-type: none"> <li>▪ Adding approximately 140 miles to the bikeway network</li> <li>▪ Improving/expanding wayfinding, trail maintenance, safety, comfort, enforcement, and end-of-trip facilities</li> <li>▪ Integrating with transit and other transport modes</li> <li>▪ Conducting promotion and education around biking in Chico</li> <li>▪ Identifying and competing for funding sources</li> </ul>	<p>2030: 1,531                  2045: 1,504</p>
2	<p><b>Require shaded and convenient bike parking:</b> Require shaded Park-a-Bike style rack or equivalent when installing bike parking.</p>	Supportive
3	<p><b>Require major road upgrades to include bicycle infrastructure:</b> Require major road upgrades to include bicycle infrastructure and its maintenance unless a significant cost/feasibility issue is shown. Update Title 18 Standard Details on each roadway section type to include the applicable bikeway modifications including Type II bikeway to local roadways and buffered bikeway for arterial and collector type roadways.</p>	Supportive
4	<p><b>Perform a street/intersection study:</b> Conduct a street/intersection study to identify streets and intersections that can be improved for pedestrians and bicyclists through traffic calming measures and/or where multi-use pathway opportunities exist to increase active transportation.</p>	Supportive
5	<p><b>Complete an Active Transportation Plan:</b> Develop and implement an Active Transportation Plan (consistent with the General Plan) that identifies funding strategies and policies for development of pedestrian, bicycle, and other modes of alternative transportation projects. Prioritize bike safety improvements and work with the City’s bike/ped working group to identify high priority areas. Improvements include:</p> <ul style="list-style-type: none"> <li>▪ Pave shoulders of streets that have high traffic counts</li> <li>▪ Separate bike lanes from motor traffic with concrete bumper blocks or better (Main, Broadway, 5th Ave, 3rd Ave, 4th Ave, Mangrove)</li> <li>▪ Pave Bidwell Park drive on north side of park and close it to vehicles or require paid parking for non-handicap access, so that road quality is better and maintenance is minimized</li> <li>▪ Establish a safe east-west connection on Bikeway 99 south of Hwy 32</li> </ul>	Supportive



Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
6	<p><b>Identify and partner with stakeholders to conduct outreach, promotion, and education:</b> Leverage partnerships with stakeholders to conduct ongoing outreach, promotion, and education around active transportation in Chico. This could include:</p> <ul style="list-style-type: none"> <li>▪ Establishing City-wide events or programs that promote active transportation in the community</li> <li>▪ Regularly updating the City’s Bicycle and Pedestrian Network Map and sharing through City and stakeholder partnership platforms</li> <li>▪ Supporting Chico Velo in hosting workshops and classes on bike riding, safety, and maintenance by certified instructors</li> <li>▪ Instituting car-free days downtown, potentially coupled with Farmer’s Market or other large and regular events</li> <li>▪ Consolidating a list of local employer-provided bicycle parking, lockers, showers, and incentives as a demonstration tool for other interested employers</li> </ul>	Supportive
7	<p><b>Hire a bike/ped/parking coordinator:</b> Establish a new bike/ped coordinator position at the City. The bike/ped/parking coordinator will ensure implementation of active and shared mobility measures.</p>	Supportive

### *Action 1: Implement Chico Bicycle Master Plan*

The overall goal of the Chico Bicycle Master Plan is to continue making Chico a more bike-friendly community, where people of all ages and abilities feel comfortable and safe choosing bicycles for transportation needs. Implementing the Chico Bicycle Master Plan 2019 Update will consist of coordinating City departments with stakeholders (e.g., Chico Velo, CUSD, Butte County, and frontline communities) to accomplish the following:

- Adding approximately 140 miles to the bikeway network based on a list of 250 prioritized projects and regular community outreach and feedback with the goal of improving connectivity throughout Chico between residential areas (especially low-income neighborhoods), schools, transit stations, recreational areas, and other key destinations
- Designing and implementing an effective network-wide wayfinding system
- Continuing current maintenance programs (e.g., monthly sweeping of all bikeway facilities and the Right-of-Way Hotline) and implementing new ones (e.g., Adopt-a-Trail program with Chico Velo, prioritizing key bike routes for paving)
- Improving safety on bike paths with regular maintenance, lighting, and video cameras, by supporting development of the Butte County Bicycle Ticket Diversion program, developing programmatic enforcement procedures, and providing bicycle safety education programs in partnership with stakeholders
- Improving comfort on bike paths by providing for and maintaining shaded routes where possible
- Improve and increase end-of-trip facilities such as secure, shaded, and well-lit bicycle parking by working with partners/stakeholders and using the permitting process for new development. The City will make bike lockers at City Hall usable for the public and add bike locker facilities at off-street parking lots
- Working with Butte Regional Transit, Greyhound Bus, and Amtrak’s Coast Starlight to integrate with transit and other transport modes to address the first/last mile challenge

- Partnering with stakeholders (e.g., CUSD, Chico Velo) to promote and encourage biking in Chico.
- Identifying and competing for available funding sources for bicycle projects

A complete description of the goals, strategy, policy, and implementation framework for expanding and improving Chico’s bikeway network is included in the Chico Bicycle Master Plan 2019 Update. The Plan will be updated every three years to ensure improvement projects are correctly prioritized and the Plan continues to meet grant funding requirements.

Fully implementing the Bicycle Master Plan is expected to increase bicycle mode share from 6% in 2017 to 12% in 2030. In order to estimate the mode shift potential associated with implementing the Bicycle Master Plan, other cities with similar buildouts were compared. Currently the City of Davis has a bike network similar to what Chico would have at full implementation. Davis currently has a 20% mode share.<sup>32</sup> Therefore, an increase in mode share from 6% to 12% is considered conservative. Emission reduction calculations assumed the average bike trip length was 1.5 miles<sup>33</sup> and used model results from EMFAC to characterize gasoline usage in Chico.

Calculations		
Year	2030	2045
Mode share shift <sup>1</sup>	6%	6%
Average passenger car mileage (mpg) <sup>2</sup>	32	38
Gasoline usage (gallons) <sup>3</sup>	14,701,198	13,554,245
Estimated % of gasoline that is used for passenger vehicles (EMFAC) <sup>2</sup>	98.0%	99.7%
Passenger vehicle gasoline usage	14,400,705	13,507,979
Estimated trips/gallon gasoline for passenger vehicles (EMFAC) <sup>2</sup>	4.32	5.37
Estimated passenger vehicle trips	62,157,314	72,471,010
New bike trips substituted for vehicle trips	3,729,439	4,348,261
New bike trips substituted for vehicle trips (miles) <sup>4</sup>	5,594,158	6,522,391
Gasoline avoided from switch to bikes (gallons)	174,242	171,083
<b>Total Reductions (MT CO<sub>2</sub>e)</b>	<b>1,531</b>	<b>1,504</b>

<sup>1</sup> Chico Bicycle Master Plan Update (2018) projects that Chico will achieve a 12% bicycle mode share by 2030 assuming the plan is fully implemented. As Chico is currently at 6% bicycle mode share, the remaining mode share shift in 2030 and 2045 is expected to be 6%.  
<sup>2</sup> Derived from EMFAC model output for Butte County 2030 and 2045  
<sup>3</sup> Values from forecast. See Appendix A.  
<sup>4</sup> Assume the average bicycle trip is 1.5 miles. Caltrans California Household Travel Survey (2013)/CARB Bike Path Reductions Technical Documentation (2019)

<sup>32</sup> <https://www.theguardian.com/cities/2015/aug/03/davis-california-the-american-city-which-fell-in-love-with-the-bicycle>

<sup>33</sup> Caltrans California Household Travel Survey (2013)/CARB Bike Path Reductions Technical Documentation (2019)

### *Action 2: Require shaded and convenient bike parking*

High quality bike parking leads to increased comfort for bikers, making it easier for residents to choose biking as a primary method of transportation. Shaded bike parking is important in areas subject to high temperatures, like Chico. Park-a-bike style racks are often preferred by cyclists because they facilitate better bike security.

### *Action 3: Require major road upgrades to include bicycle infrastructure*

Including bicycle infrastructure at the time of major road upgrades significantly decreases the cost of installation. This action is included as a best practice to decrease the cost burden on the City and further facilitating its timely implementation of the Bicycle Master Plan.

### *Actions 4 & 5: Perform a street/intersection study & complete an Active Transportation Plan*

Performing a street/intersection study will provide the necessary traffic pattern information and firsthand feedback from the community to better identify and eliminate the hurdles which keep people from walking and biking. This information can be used to complete an Active Transportation Plan – a key recommendation of the Chico Bicycle Master Plan to integrate bicycle, pedestrian, and transit planning in Chico. These actions would be undertaken in coordination with the City's bike/ped working group, which has already identified some high-priority projects.

Currently, the engineering department is applying for a grant to update all 106 traffic signals throughout the City to smart technologies. The grant would replace the hardware and software of traffic lights to an Intelligent transportation system (ITS). The system adapts to peak demand times to increase traffic flow and reduce idling between 20-50%. Roundabout on East Avenue and Wildwood Avenue leading to Upper Park Road was completed in 2011. The City is also looking into installing a flashing yellow arrow pilot project on 5<sup>th</sup> and Mangrove. Flashing yellow arrows have been proven to be more easily and intuitively understood by drivers. The City has also completed a number of roundabout installation projects and has identified funding for more. Roundabouts improve safety and reduce vehicle emissions by eliminating engine idling times at red lights.

Improving active transportation networks is an important part of building Complete Streets – streets that accommodate bikes, cars, shared transit, and pedestrians in an accessible way. Nationally, 16.4% of vehicle trips were one mile or less in 2017, a distance easily travelled by foot or bicycle. 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, not much research has been conducted to determine quantitatively how improving the pedestrian network 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. One study from 1993 looked at how improving a pedestrian network affected the number of vehicle miles travelled in Portland, OR in 1985 and found that a 1% increase in the pedestrian network was associated with a 0.14% decrease in number of vehicle trips travelled.

*Action 6: Identify and partner with stakeholders to conduct outreach, promotion, and education*

Providing education on the benefits of active transportation as well as technical information such as trip planning, incentives and other programs will help generate momentum around active transportation and support the overall measure. The City currently runs a program that provides a \$50 credit for City employees who bike to work and coordinates with Chico Velo to run a Bike-to-Work month. The additional promotional activities identified under this action will continue to build these kinds of programs.

*Action 7: Hire a bike/ped/parking coordinator*

A bike/ped/parking coordinator position has been discussed for multiple years by City staff, to help coordinate active transportation promotional and education programs and work with the Bike & Ped working group as well as other City partners and stakeholders. This action is supportive to the overall measure and particularly supportive to Action 6.

## Measure T-2: Improve ZEV infrastructure to achieve greater than 23% shift to ZEVs by 2030, and 90% by 2045

Action #	Action	Anticipated Reduction (MT CO <sub>2e</sub> )
1	<p><b>Increase privately owned EV charging infrastructure:</b> In accordance with the Final Butte PEV Readiness Plan, amend the City’s Building Code to require the following:</p> <ul style="list-style-type: none"> <li>▪ EV capable attached private garages for new single-family and duplex residential development</li> <li>▪ 20% EV capable charging spaces and panel capacity for new multi-family residential development</li> <li>▪ 20% EV capable charging spaces for new commercial development</li> <li>▪ At least 1% working chargers for all new development and major retrofits</li> </ul>	2030: 27,338
2	<p><b>Increase publicly accessible EV charging infrastructure:</b> Work with public and private partners to ensure there are at least 951 publicly accessible DCFC and Level 2 EV chargers around the City, with a focus on providing access to low-income households and affordable housing by 2030. Prioritize locations based on analysis in the Final Butte PEV Readiness Plan.</p>	2045: 105,496
3	<p><b>Increase City-owned EV charging infrastructure:</b> Install new publicly accessible EV chargers at City-owned facilities. Develop and implement a fee for use of City-owned chargers to encourage efficient use and turnover, especially for those without home charging capability. Allocate parking fee revenue towards projects that support EV infrastructure, alternative fuel projects, and active transportation projects.</p>	
4	<p><b>Identify and partner with stakeholders to develop ZEV-related rebates:</b> Investigate partnerships with public and private stakeholders to develop rebates on at-home electric circuits, panel upgrades, and Level 2 chargers.</p>	Supportive
5	<p><b>Encourage EV adoption and infrastructure improvements:</b> Conduct outreach, promotion, and education to encourage EV adoption and infrastructure improvements. This would include the following:</p> <ul style="list-style-type: none"> <li>▪ Providing education and outreach to the community on the benefits of ZEVs, availability of public charging, and relevant rebates and incentives available for businesses and residents</li> <li>▪ Working with major employers (e.g., CSUC, Fifth Sun, Build.com, Enloe) to provide EV charging for employees and encourage EV adoption among employees</li> </ul>	Supportive
6	<p><b>Establish electrical and technical standards for EVSE:</b> EVSE standards to be established include construction of equipment, wiring methods, and safety protection, consistent with the California Electrical Code and the Underwriter’s Laboratories guidance on EVSE.</p>	Supportive
7	<p><b>Establish universal EV signage:</b> Establish universal signage and marking requirements for EV parking spaces.</p>	Supportive

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
8	<p><b>Streamline the EVSE permitting and inspection processes:</b> Streamline both processes through the following mechanisms:</p> <ul style="list-style-type: none"> <li>▪ Prioritizing EVSE permitting for faster turnaround times</li> <li>▪ Establishing flat fees for standard installations</li> <li>▪ Enabling homeowners and licensed contractors to submit EVSE permit applications online</li> <li>▪ Allowing EVSE across different zoning classifications</li> <li>▪ Considering simple EVSE installations as exempt from CEQA on a case-by-case basis</li> <li>▪ Allowing installation of EVSE as a mitigation measure for large projects</li> <li>▪ Condensing inspections for more complex installations that do not include panel upgrades or underground conduit</li> <li>▪ Establishing a 24-hour flexible inspection request program online</li> <li>▪ Providing shorter inspection windows</li> <li>▪ Removing requirement for electrician to be present during inspection to decrease consumer costs</li> </ul>	Supportive

*Actions 1, 2, and 3: Increase privately owned, publicly accessible, and City-owned EV charging infrastructure*

Actions 1, 2, and 3 together will provide the primary mechanism through which the City of Chico will encourage EV adoption within the community. The state has established a goal of putting 5 million EVs on the road by 2030. However, the recent passing of executive order N-79-20 calls for 100% of passenger vehicles to be all electric by 2035. This new executive order puts the total number of EV’s on the road by 2035 at approximately 15 million.<sup>34</sup> Based on the current number of vehicles registered in California and a 2% growth rate per year, 15 million EV’s accounts for 35% of total vehicles in 2035. Interpolating between today’s EV percentage (5%) gives us an expected EV adoption rate of 25%. The City has established its own goal in line with this and aims to reach 23% EV adoption by 2030 and 50% by 2045. Chico currently has 299 electric vehicles and 311 plug-in hybrid vehicles out of 86,548 currently registered, accounting for 0.7% of the vehicles registered within the City.<sup>35</sup> If 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 to buy and use ZEVs rather than gas-powered vehicles, the City will take actions to incentivize this behavior change and support this level of EV adoption. The City’s primary target to achieve this measure is 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 Chico already has 12 existing public charging stations with another 4 funded, 950 new public chargers are needed to meet the forecasted demand by 2030. The need for charging infrastructure may change over time, depending on new technologies such as smart chargers and trends in personal EV

<sup>34</sup> <https://spectrumnews1.com/ca/la-west/transportation/2020/10/05/what-it-will-take-to-sell-100-evs-in-california>

<sup>35</sup> [https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes\\_City\\_01012020.pdf](https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes_City_01012020.pdf)

adoption. The City will continue to monitor the most recent research on EV infrastructure needs and update long-term goals as necessary.

**Action 1:** This action will account for the majority of the targeted number of EV chargers in 2025 and 2030. 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.<sup>36</sup>

**Actions 2 & 3:** The City of Chico currently hosts 12 publicly available EV charging stations, with an additional 4 installations in the works. In the City, public charging stations are clustered along the Hwy 99 corridor, with a new Level 2 charging station opening at the new CA Hwy Patrol offices at Hwy 99 and Southgate Avenue. Chico has DC Fast Charging Stations at 3 locations; Butte College Skyway Center, Chico Nissan Cohasset Rd, and Sierra Nevada Brewing Company. Additional Level 2 public charging stations are located at Sierra Nevada Brewing Company, Butte College Chico Center, Oxford Suites on Business Lane, Enloe Medical Center parking garage on the Esplanade, Chico Volkswagen on Main Street, CSUC on Cherry Street, Sun Valley Acoustical on Ivy Street, and Alternative Energy Systems at Hwy 99. In addition to increasing EV charging infrastructure, Chico has committed to replacing fleet vehicles with electric vehicles when feasible.

The Public Works Department established a fee to recover the costs for use of City-owned EV charging units at the rate of 0.2\$ per Kilowatt hour. This fee will be used to maintain the charging units and to cover electricity costs. While not directly quantifiable, EV charging fees will increase turnover at charging stations, helping to promote equitable access to EV charging infrastructure and encourage widespread EV adoption across a greater demographic range.

The next phase for EVSE expansion will provide additional publicly accessible charging. Emission reductions from Actions 1, 2, and 3 were calculated together as emissions saved by meeting EV adoption goals in 2030 and 2045.

Calculations		
Year	2030	2045
Gasoline sales after mode shift to bikes (gallons) <sup>1</sup>	14,226,463	13,336,896
Emissions from gasoline (MT CO <sub>2</sub> e) <sup>2</sup>	125,036	117,218
EV adoption <sup>3</sup>	23%	90%
Emissions from gasoline saved (MT CO <sub>2</sub> e)	28,758	58,609
Average gas mileage (MPG from EMFAC) <sup>4</sup>	32	38
Average kWh/gallon of gas	109	130
Electricity EF (MT CO <sub>2</sub> e/kWh) <sup>5</sup>	0.0000040	0.0000000
Emissions from electricity usage for EVs	1,420	0
<b>Total Reductions (MT CO<sub>2</sub>e)</b>	<b>27,338</b>	<b>105,496</b>

<sup>36</sup> <https://www.swenergy.org/cracking-the-code-on-ev-ready-building-codes>

<sup>1</sup> Gasoline sales from forecast (see Appendix A) minus gasoline avoided from mode shift to bikes  
<sup>2</sup> Based on an emission factor of 0.008789 MT CO<sub>2</sub>e/gallon gasoline, as established in Appendix A  
<sup>3</sup> Based on executive order N-79-20 100% of passenger vehicle sales will electric by 2035. Assuming 15 million EV's 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 EV's California would be projected to have 25% EV's by 2030. 23% is therefore a more conservative estimate 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>)  
<sup>4</sup> Derived from EMFAC model output for Butte County 2030 and 2045  
<sup>5</sup> The residential electricity emission factor was calculated based on opt-out rates for different CCA customers. See Measure E-3 for further details on this calculation.

The number of new public chargers needed to support Chico’s EV adoption goals were also calculated, based on 2020 vehicle registration data from the DMV and the assumption that one public charger should be available for every 20 EVs, taking into account the 12 built and 4 funded public EV charging stations already in the City. Total registered vehicles were forecasted based on the 2020 ratio of registered vehicles to population.

EV Charger Count Calculations		
Year	2030	2045
Population <sup>1</sup>	108,750	118,332
Total registered vehicles <sup>2</sup>	84,118	91,529
Registered EV goal <sup>3</sup>	19,347	82,376
EV's per Charger <sup>4</sup>	20	20
New public EV chargers needed <sup>5</sup>	951	4,103

<sup>1</sup> Values from forecast. See Appendix A.  
<sup>2</sup> Based on a calculated value for cars for capita (0.773) derived by dividing the total number of registered vehicles in Chico in 2020 ([https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes\\_City\\_01012020.pdf](https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes_City_01012020.pdf)) by the 2020 population of Chico as established in Appendix A.  
<sup>3</sup> Calculated as total registered vehicles multiplied by EV adoption percentage in above table  
<sup>4</sup> [https://theicct.org/sites/default/files/publications/US\\_charging\\_Gap\\_20190124.pdf](https://theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf)  
<sup>5</sup> Based on the assumption that approximately one public EV charger is needed per 20 EVs, taking into account the existing 16 EV chargers already in Chico. This assumption may change over time due to better technology, changes to consumer behavior, or both. The total number of chargers especially in 2045 will need to be revisited to ensure the numbers reflect the current EV landscape<sup>37</sup>

*Action 4: Identify and partner with stakeholders to develop ZEV-related rebates*

The primary barrier to EV adoption is consumer costs related to the purchase of the vehicle and associated home charging equipment. Developing ZEV-related rebates in partnership with City stakeholders will shift the cost burden away from community members, encouraging higher EV adoption rates.

*Action 5: Encourage EV adoption and infrastructure improvements*

Providing information on existing and future programs, incentives, resources, and benefits of electric vehicle adoption to the community will increase adoption and contribute to the overall goal of EV adoption in the City. The City will encourage EV adoption and infrastructure improvements through a coordinated education, promotion, and outreach campaign. Educating the community on the benefits of EVs and partnering with stakeholders to provide more targeted outreach to specific community groups will support the overall goals of the measure. To facilitate the installation of EVSE by residents, Chico will

<sup>37</sup> [https://theicct.org/sites/default/files/publications/US\\_charging\\_Gap\\_20190124.pdf](https://theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf)



additionally develop guidance documents that summarize local building code and permitting requirements related to EVSE installation, to be provided online

*Action 6: Establish electrical and technical standards for EVSE*

The Final Butte PEV Readiness Plan recommends that local agencies establish electrical and technical standards for EVSE, including construction of equipment, wiring methods, and safety protection. Relevant standards can be found in the California Electrical Code and the Underwriter's Laboratories guidance on EVSE. This measure ensures that Chico will have clear guidelines and standards in place for installing EVSE infrastructure.

*Action 7: Establish universal EV signage*

The Final Butte PEV Readiness Plan identifies clear, consistent, and visible EV signage as vital for ease of use and reduction of potential issues and conflicts associated with EV charging. The Readiness Plan recommends using standard signs and markings for EV charging stations and parking stalls contained in the California Manual of Uniform Traffic Control Devices to ensure signage consistency throughout the Butte County region.

*Action 8: Streamline the EVSE permitting and inspection processes*

Streamlining the permitting and inspection procedures for EVSE ensures 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 streamline the EVSE permitting and inspection process to further ease the burden on new EV owners and support the goals of the measure.

### Measure T-3: Improve shared mobility and transit programs and infrastructure

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<p><b>Partner with BCAG and Butte Regional Transit to improve and expand transit within the City:</b>  This could include:</p> <ul style="list-style-type: none"> <li>▪ Expanded transit service, especially along transit priority corridors, and more frequent and reliable transit service. More frequent transit can begin to act as a shuttle, especially since downtown employees and CSUC students and faculty are eligible for free transit passes</li> <li>▪ Improved and/or more efficient transit technology</li> <li>▪ Improved service/communication through interactive service maps, app payments, and real time arrival info</li> <li>▪ Increased active transportation access to transit stops</li> <li>▪ Enhanced, comfortable stops and stations</li> <li>▪ Education and outreach to the community on new and existing shared transit options</li> <li>▪ Subsidized transit passes</li> <li>▪ New electric hop-on hop-off trolley service through major points of interest (e.g., downtown, Bidwell Park, Bidwell Mansion, Sierra Nevada, fair grounds, Chico State)</li> </ul>	Supportive
2	<p><b>Prepare for shared bike programs:</b> Conduct an active transportation share (e.g., bike-share, scooter-share) feasibility study. Update municipal ordinances to prepare the City for shared mobility programs in accordance with the Bicycle Master Plan and the Downtown Access Plan. Consider starting a bike share pilot program in downtown, ideally with docked e-bikes.</p>	Supportive
3	<p><b>Require transportation system management for new construction:</b> Draft and implement a Transportation System Management Plan (TSMP) ordinance for new construction to allow the City to shift travel behavior away from single-occupancy vehicles. Ensure telecommuting is an optional trip reduction strategy.</p>	Supportive
4	<p><b>Conduct a transportation equity study:</b> Conduct a transportation equity study to investigate current barriers for minority, low-income, and senior populations to take transit, walk, bike, use rideshare, or carshare.</p>	Supportive
5	<p><b>Conduct a local transportation survey:</b> Conduct local transportation surveys every five years to better understand the community's needs and motivation for travelling by car versus other alternatives such as by bike or bus. Use survey results to inform transit expansion and improvement projects.</p>	Supportive
6	<p><b>Encourage and facilitate carsharing services:</b> Perform ongoing outreach to carsharing companies about the potential to implement a carsharing program in Chico, preferably electric.</p>	Supportive
7	<p><b>Encourage use of local transit:</b> Promote use of B-Line for downtown transit especially. This could include bus open houses and promotion of DoubleMap app.</p>	Supportive
8	<p><b>Invest in TDM strategies:</b> In accordance with the Downtown Access Plan, designate and use a portion of paid parking revenue to invest in TDM strategies including Actions 1-6 that will ensure cost-effective downtown access by improving transit, bicycle facilities, and create incentives for people to avoid driving.</p>	Supportive
8	<p><b>Prepare for shared bike programs:</b> Conduct an active transportation share (e.g., bike-share, scooter-share) feasibility study. Update municipal ordinances to prepare the City for shared mobility programs in accordance with the Bicycle Master Plan and the Downtown Access Plan. Consider starting a bike share pilot program in downtown, ideally with docked e-bikes.</p>	Supportive

*Action 1: Partner with BCAG and Butte Regional Transit to improve and expand transit within the City*

In general, increases and improvements to public transportation systems reduce a city's dependence on fossil fuels and reduce VMT. 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. Each new mile of transit usage replaces VMT on much more than a 1:1 basis. Approximately 1% increase in transit frequency saves 0.5% in VMT.<sup>38</sup> Bus Rapid Transit can also yield a corridor-level VMT reduction of 1-2%.<sup>39</sup>

In addition, 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.<sup>40</sup> Further, improving transit access has the potential to shift trips from cars to transit, which may reduce vehicle trips, VMT, and greenhouse gas emissions, with time spent getting to a transit stop being the key indicator of transit access.<sup>41</sup> While difficult to directly quantify, improving transit stops and stations can contribute to improved transit access, and is therefore an important component of the overall measure.

*Action 2: Prepare for shared bike programs*

A 2019 report from the City of Santa Monica found that 49% of shared rideable trips replaced vehicle trips based on answers to survey questions.<sup>42</sup> A 2014 study from Utrecht University suggests that the car substitution rate of shared rideables is dependent on what proportion of trips are already taken by car in a city.<sup>43</sup> In the study, Minneapolis and Melbourne had between 70% and 76% vehicle mode share in 2014 and showed high rates of car mode substitution (19% to 21%) after shared rideables were introduced. On the other hand, London and Washington DC had between 36% and 46% vehicle mode share in 2014 and showed much lower rates of car mode substitution where shared rideables were introduced (2% to 7%). Sacramento and Santa Monica both had high vehicle mode share (83% and 72% respectively) before shared rideables were introduced, suggesting that the City of Chico would see a similar if not higher car substitution rate of shared rideables as Santa Monica and Sacramento. Both studies previously mentioned suggest that average trip duration of shared rideable trips is about 2 miles (this is seen consistently across the six diverse cities mentioned above) and appears to be largely independent of other city metrics.

An e-bike ride share program has the potential to be even more successful, as e-bike riders can go longer distances and are more accessible to non-riders. A study in Portland, OR found that a 15% e-bike mode share could result in a 12% reduction in transportation-related emissions.<sup>44</sup>

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<sup>38</sup> <https://www.smartgrowthamerica.org/app/legacy/documents/smartgrowthclimatepolicies.pdf>

<sup>39</sup> <https://www.smartgrowthamerica.org/app/legacy/documents/smartgrowthclimatepolicies.pdf>

<sup>40</sup> <https://transitleadership.org/docs/TLS-WP-Improving-the-Customer-Experience.pdf>

<sup>41</sup> [https://ww3.arb.ca.gov/cc/sb375/policies/transitaccess/transit\\_access\\_brief120313.pdf](https://ww3.arb.ca.gov/cc/sb375/policies/transitaccess/transit_access_brief120313.pdf)

<sup>42</sup> [https://www.smgov.net/uploadedFiles/Departments/PCD/Transportation/SantaMonicaSharedMobilityEvaluation\\_Final\\_110419.pdf](https://www.smgov.net/uploadedFiles/Departments/PCD/Transportation/SantaMonicaSharedMobilityEvaluation_Final_110419.pdf)

<sup>43</sup> <http://mobility-workspace.eu/wp-content/uploads/Bike-shares-impact-on-car-use-3.pdf>

<sup>44</sup> <https://www.sciencedirect.com/science/article/pii/S1361920920306696>

*Action 3: Require transportation system management for new construction*

Requiring new projects to develop a transportation system management plan will help control expansion of passenger vehicle trips in the future and contribute to providing much-needed infrastructure for active transportation options as part of the cost of new projects. Newly construction office buildings or other places of work could also consider meeting these requirements through a telecommuting strategy. In light of the recent changes made to combat the spread of COVID-19, telecommuting has proven to be an implementable and effective strategy for reducing reliance on passenger vehicles. Continuing to leverage the telecommuting and remote work lessons learned during the pandemic will allow the City of Chico to reduce transportation emissions well into the future.

*Action 4: Conduct a transportation equity study*

A transportation equity study would help ensure the actions supporting shared mobility are implemented in an equitable way. From an emission reduction perspective, this is important because it ensures the active transportation programs and infrastructure built going forward facilitates rather than inhibits all segments of the population to take part. Ensuring all residents can take part in these programs means maximizing GHG reduction benefits. From an equity perspective, it can increase transportation access for those who need it most and decrease the social burdens experienced by many frontline communities. Comprehensive equity analysis allows planners to better anticipate problems and incorporate equity objectives in planning.<sup>45</sup>

*Action 5: Conduct a local transportation survey*

Conducting local transportation surveys will help the City to better understand the community's needs and motivations for travelling by car versus other alternatives such as by bike or bus. This will allow the City to respond dynamically to the needs of the community and optimize active transportation projects. The surveys will also help inform the evolving list of projects included as part of the Bicycle Master Plan.

*Action 6: Encourage and facilitate carsharing services*

Research from the Transportation Sustainability Research Center at the University of California Berkeley shows that car share programs lower vehicle ownership and overall VMT.<sup>46</sup> While a majority of car share members use the program to add or replace vehicle trips (leading generally to small VMT increases), a minority of members (2-5%) use car share as a replacement for vehicle ownership (leading generally to larger VMT reductions). The net effect is overall decrease in vehicle ownership, VMT, and ultimately GHG emissions. Approximately one car share vehicle replaces seven to eleven cars and VMT is reduced, on average, between 6% to 16% per car share household assuming one-way usage.

*Action 7: Encourage use of local transit*

Encouraging use of local transit could help shift Chico residents away from passenger vehicles and increase transit mode share. The City currently partners with BCAG to subsidize transit passes for employers and employees who work or live within the Central Business District of Chico. Bus passes are also provided to City of Chico employees and CSUC staff and students. This will be especially effective when combined with improvement and expansion of transit services, as described under Action 1.

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<sup>45</sup> <https://www.vtpi.org/equity.pdf>

<sup>46</sup> [http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go\\_FiveCities\\_2016.pdf](http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_FiveCities_2016.pdf)

*Action 8: Invest in TDM strategies*

This action will help provide funding for the other actions under Measure T-3.

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**Measure T-4: Implement parking and curb management procedures that support the mode shift goals of the overall transportation strategy**

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Utilize dynamic pricing downtown:</b> In accordance with the Downtown Access Plan, utilize dynamic pricing for downtown area parking, increasing costs of parking during times of high usage and special events.	Supportive
2	<b>Improve curbside management:</b> Improve curbside management in accordance with the Downtown Access Plan. This includes updating the municipal code to require active loading only, prohibit double parking, define locations for additional loading zones, and design loading zone signage.	Supportive
3	<b>Encourage parklets downtown:</b> Allow for development of parklets throughout the City’s downtown, to replace parking spaces with bike parking or outdoor restaurant seating.	Supportive
4	<b>Establish carpool/vanpool/shuttle minimums:</b> Update the Zoning Code to establish minimums for carpool/vanpool/shuttle parking requirements in new non-residential development.	Supportive

*Action 1: Utilize dynamic pricing downtown*

Curbside management strategies can help shift cities towards sustainable citywide mobility without compromising space and business needs.<sup>47</sup> In San Francisco, a parking pilot program called SFPark instituted dynamic parking pricing for on-street parking and experienced a 30% drop in VMT for the area, 8% drop in traffic volume, and improved meter compliance and parking turnover.<sup>48</sup> In general, increasing the price to park is one of several related factors that can reduce VMT and promote mode switching.<sup>49</sup> This approach is more effective when combined with infill development, investments in alternative transportation, and travel demand management programs.

*Action 2: Improve curbside management*

Curb space is a major resource within the City serving multiple functions relating to mobility. By continuing to price curb space appropriately and preparing for a change to autonomous vehicles, the City of Chico can ensure the highest and best use of this limited resource.

*Action 3: Encourage parklets downtown*

Over the past 6 years, Chico has seen an influx of outdoor restaurant seating that has replaced parking spaces in downtown. Encouraging this type of expansion is not only good for businesses<sup>50</sup> downtown but reduces parking spaces to help the City reduce emissions from cars.<sup>51</sup>

<sup>47</sup> <https://nacto.org/wp-content/uploads/2017/11/NACTO-Curb-Appeal-Curbside-Management.pdf>

<sup>48</sup> <https://www.ite.org/pub/?id=C2D66E96%2DFF01%2D0BA8%2D68C3%2D65CC9116A5AE>

<sup>49</sup> <https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/f0016902-final-pricing-parking-management-to-reduce-vehicles-miles-travelled-pi.pdf>

<sup>50</sup> <https://www.bloomberg.com/news/articles/2014-10-13/3-ways-that-turning-parking-spots-into-parklets-helps-businesses>

<sup>51</sup> <https://www.scientificamerican.com/article/reducing-parking-cut-auto-emission/>

*Action 4: Establish carpool/vanpool/shuttle minimums*

Establishing parking minimums for carpool, vanpool, and shuttles in new non-residential development can incentivize shared transportation and encourage a shift away from single passenger vehicles.

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**Measure T-5: Support sustainable infill development to reduce VMT**

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Support infill growth:</b> Continue to support infill growth and reduce suburban sprawl consistent with the Chico 2030 General Plan and the regional Sustainable Communities Strategy.	Supportive

*Action 1: Support infill growth*

While not easily quantifiable, infill growth that increases density within areas of the community that provide multiple services and better access to jobs can help reduce per capita emissions in those areas due to reduced VMT. This is especially effective if paired with affordable housing policies and programs, as this allows a greater portion of the population to access high density areas and reduce their emissions. Affordable housing can therefore also help reduce suburban sprawl. A Berkeley study on carbon footprint planning suggests that a 10-fold increase in population density in central cities corresponds to 25% lower GHG emissions<sup>52</sup> due mostly to decreases in VMT. This can be substantially increased if efforts are additionally made to reduce suburban sprawl. Another study conducted by UC Davis found that a 10% increase in residential density would reduce VMT by 1.9%.<sup>53</sup> University of Waterloo performed a case study in Toronto to determine how quickly existing areas could be densified to meet minimum transit supportive density thresholds. The study found that 3.8 million additional residents could be residing in transit supportive environments if about 1.2 million units were added with current unit densities between 5 and 20 units per hectare. Given historic growth rates, units could be built within 34 to 95 years. Co-benefits of these action include increased stability and access to services for disadvantaged communities.

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<sup>52</sup> <https://www.cogitatiopress.com/urbanplanning/article/view/1218/1218>

<sup>53</sup> <https://www.sciencedirect.com/science/article/pii/S0191261510000536>



## 5 Waste

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Emission reductions in the waste sector are driven by compliance with SB 1383, which requires all jurisdictions in California to reduce organic waste disposal 75% and increase edible food recovery 20% relative to 2014 levels by 2025. CalRecycle has provided a suite of recommendations and requirements for complying with SB 1383, including the following:

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

The main mechanism through which Chico will comply with SB 1383 is by updating waste hauler contracts and identifying and partnering with appropriate stakeholders to ensure requirements for organic waste reduction and edible food recovery are met (Measure W-1). The details of the measure, including its supporting actions and evidence of its GHG reduction potential, are included below.

## Measure W-1: Update waste hauler contracts to implement requirements of SB 1383 and achieve 75% reduction in organic waste by 2025

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Require residential and commercial organic waste collection through updated waste hauler contracts:</b> Update waste hauler contracts to include expanded organic waste collection. Pass an ordinance by 2022 requiring residential and commercial organics generators to subscribe to organics collection programs or alternatively report organics self-hauling and/or backhauling. Allow limited waivers and exemptions to generators for de minimis volumes and physical space constraints and maintain records for waivers/exemptions.	2030: 7,693 2045: 7,693
2	<b>Require edible food recovery:</b> Adopt an edible food recovery ordinance or similarly enforceable mechanism to ensure edible food generators, food recovery services, and food recovery organizations comply with requirements to increase recovery rates	Supportive
3	<b>Increase the City’s recycled product procurement:</b> Ensure that at least 75% of the City’s annual purchase of paper products contains at least 30% certified post-consumer fiber paper and increase procurement and use of compost to meet California Model Water Efficient Landscape Ordinance requirement for incorporating compost into new and renovated permitted landscapes.	Supportive
4	<b>Partner with North State Rendering to expand use of the digester:</b> Work with North State Rendering to expand use of organics in the digester. Conduct a pilot to demonstrate effectiveness and identify funding sources for a larger expansion.	Supportive
5	<b>Conduct capacity planning for organic waste collection:</b> Engage in organic waste collection capacity planning by executing the following: <ul style="list-style-type: none"> <li>▪ Estimate Chico’s disposal of organic waste in tons</li> <li>▪ Identify and verify amount of available organic waste recycling infrastructure</li> <li>▪ Estimate the amount of new or expanded capacity needed to process organic waste</li> <li>▪ Work with the City of Chico’s Recycling and Solid Waste Division and waste haulers to verify the facility where they will transport organic waste</li> <li>▪ Develop and submit an implementation schedule highlighting planning effort to provide enough new or expanded organics capacity, including timelines and relevant milestones by the end of the report period</li> <li>▪ Identify proposed new or expanded facilities that could be used for additional capacity</li> <li>▪ Standardize all colors and labels for carts, dumpsters, debris boxes, compactors for garbage, recycling, and organics based on SB 1383 statewide requirements</li> </ul>	Supportive

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
6	<p><b>Conduct capacity planning for edible food recovery:</b> Engage in edible food recovery capacity planning by executing the following actions:</p> <ul style="list-style-type: none"> <li>▪ Estimate the amount of edible food that will be disposed by organics generators in Chico</li> <li>▪ Work with commercial food generators to reduce excess edible food generation</li> <li>▪ Work regionally to establish a full list of food recovery organizations that can receive edible food from Chico businesses</li> <li>▪ Identify proposed new or expanded food recovery capacity</li> <li>▪ Identify the minimum capacity required to recover 20% of edible food that is estimated to be disposed</li> <li>▪ If existing and planned capacity is insufficient based on the above process, the City of Chico must develop and submit an implementation schedule highlighting the planning effort to provide enough new or expanded capacity for increasing edible food donations and identify proposed new or expanded facilities to be used to for additional capacity</li> </ul>	Supportive
7	<p><b>Develop and implement a partnered education and outreach program:</b> Update waste hauler contracts and partner with stakeholders (e.g., CUSD, Chico State, BEC) to develop and implement an education and outreach program around SB 1383:</p> <ul style="list-style-type: none"> <li>▪ Conduct outreach and education at schools on composting, recycling, and waste reduction</li> <li>▪ Provide education to the community on home composting techniques</li> <li>▪ Inform organics generators/edible food generators on requirements to properly separate materials, organic waste prevention and on-site recycling, methane reduction benefits of composting, and information related to edible food donation</li> <li>▪ Hold a compost give-away event for Chico residents</li> <li>▪ Identify percentage of organics generators who are “limited English-Speaking households” or “linguistically isolated.” If more than five percent (5%) of Chico’s organics generators are defined as “limited English-speaking households” or linguistically isolated,” provide education and outreach in a language or languages that will assure the information is understood by that community</li> </ul>	Supportive
8	<p><b>Develop and implement an inspection and compliance program:</b> Update waste hauler contracts to implement an inspection and compliance program for the edible food recovery program and organics procurement program with defined enforcement mechanisms and penalties, to begin prior to 2024. Maintain records of compliance in accordance with SB 1383.</p>	Supportive

*Action 1: Require residential and commercial organic waste collection through updated waste hauler contracts*

Requiring residential and commercial organic waste generators to subscribe to an organics collection program (provided through updated waste hauler contracts) is expected to provide the level of composting required to reduce Chico’s organic waste disposal 75% below 2014 levels by 2025, one of the primary goals of SB 1383. Both waste haulers in Chico have been working diligently to expand composting services, and Recology is in the process of building their first composting facility. Chico residents are currently able to drop off yard and greenwaste at the composting facility at the airport. This action will capitalize on those efforts and expand them to meet the necessary composting capacity.

Chico sent almost 70,000 tons of municipal solid waste to the landfill in 2014 (see Appendix A), of which approximately 45% was organic (18% food, 17% mixed paper, and 9% yard waste).<sup>54</sup> Calculations assumed that emission reductions would come from diverting that waste to compost, decreasing the disposal emission factor to zero. In fact, the emission factor for composting those materials is negative, due to the carbon sequestration potential of compost, but these negative emissions were not credited to the City of Chico as carbon sequestration of the compost would occur at the location of procurement. For the purposes of emission calculations, landfill emission factors were assumed to be 0.388 MT CO<sub>2</sub>e/ton for food, 0.334 MT CO<sub>2</sub>e/ton for mixed paper, and 0.207 MT CO<sub>2</sub>e/ton for yard waste.<sup>55</sup>

Calculations		
Year	2030	2045
Organics reduction from 2014 <sup>1</sup>	75%	75%
Diverted food (tons) <sup>2</sup>	9,447	9,447
Diverted mixed paper (tons) <sup>2</sup>	9,082	9,082
Diverted yard waste (tons) <sup>2</sup>	4,802	4,802
Emissions from landfilling (MT CO <sub>2</sub> e) <sup>3</sup>	7,693	7,693
<b>Total Reductions (MT CO<sub>2</sub>e)</b>	<b>7,693</b>	<b>7,693</b>

<sup>1</sup> SB 1383 requires 75% reduction in organic waste from 2014 levels by 2025.  
<sup>2</sup> Total diverted organic waste calculated as 75% of 2014 waste levels, as established in Appendix A (69,595 tons). Per CalRecycle, approximately 18.1% of organic waste is food, 17.4% is mixed paper, and 9.2% is yard waste.  
<https://www2.calrecycle.ca.gov/Publications/Download/1301>  
<sup>3</sup> Assumes the emission factor is 0.338 MT CO<sub>2</sub>e/ton for food, 0.334 MT CO<sub>2</sub>e/ton for mixed paper, and 0.207 MT CO<sub>2</sub>e/ton for yard waste per *Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities* (CARB, 2017)

*Action 2: Require edible food recovery*

An edible food recovery ordinance will provide an enforceable mechanism through which the City can help organics generators meet the edible food recovery requirements of SB 1383. Jurisdictions are responsible for implementing an edible food recovery program for commercial edible food generators. This means ensuring that there are edible food recovery organizations that have enough capacity and collection services, which will be accomplished through implementation of Action 6. Commercial edible food generators must recover for human consumption the maximum amount of their edible food that they would otherwise dispose of in landfills by making written agreements with food recovery organizations or services to accept this food instead. “Tier One” food generators — supermarkets and large grocery stores, food services providers, food distributors and wholesale food vendors — must comply beginning January 1, 2022. “Tier Two” food generators — large restaurants, hotels with an on-site food facility and 200 or more rooms, health facilities with an on-site food facility and 100 or more beds, large venues and large events, state agencies with large cafeterias and local education agencies with on-site food facilities — have until January 1, 2024 to comply.

CalRecycle currently does not have an estimate for what percentage of the California waste stream is edible, therefore the effects of this action have not been quantified but characterized as supportive.

<sup>54</sup> Percentages are state averages. <https://www2.calrecycle.ca.gov/Publications/Download/1301>

<sup>55</sup> *Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities* (CARB, 2017)

However, CalRecycle estimates that every 2 ½ tons of edible food recovered is the equivalent of taking one car off the road for a year.<sup>56</sup>

### *Action 3: Increase the City's recycled product procurement*

Increasing recycled product procurement through City product purchases will lower the City's consumption-based emissions – emissions attributed to the production of materials brought into the City – and provide a local market for recycled products, including recycled paper and compost.

**Recycled paper:** Over 30 years, recycled paper can deliver 1.1 to 1.95 gigatons of carbon dioxide emission reductions.<sup>57</sup> This is because recycled paper produces about 25% fewer total emissions than conventional paper. A particular piece of paper can be reprocessed roughly five to seven times, before fibers are no longer viable, avoiding methane emissions from landfilling each time. Recycling paper has the added benefit of saving trees and reducing water waste.

**Compost:** Composting avoids methane production in landfills, with the added benefit of carbon sequestration ability, which actively removes carbon from the atmosphere. Additional benefits to using compost are improved soil health, reduced soil loss, increased water filtration and storage, and reduction of other inputs.<sup>58</sup>

### *Action 4: Partner with North State Rendering to expand use of the digester*

North State Rendering is located in Oroville, CA and manages the anaerobic digester at the old rendering plant. Digestate is currently being buried at the landfill, leading to avoidable emissions. Anaerobic digestion can help develop clean energy sources and reduce GHG emissions.<sup>59</sup> Anaerobic digestion systems capture methane from feedstock that might otherwise be released into the atmosphere as a potent gas. The captured methane can then serve as an energy source to produce heat or generate electricity. The main barrier to expanded use of the digester is the high capital costs to operate it, which may be offset by grant opportunities. California offers credits through its Low Carbon Fuel Standard program that could provide funding for this type of project.

### *Actions 5 & 6: Conduct capacity planning for organic waste collection and edible food recovery*

SB 1383 requires jurisdictions to conduct capacity planning around SB 1383 to ensure organics recovery and edible food recovery targets can be reasonably met. Conducting capacity planning will help the City develop an implementation plan for SB 1383 and provide information for discussions with waste haulers and other stakeholders, providing support for the GHG reductions expected from overall measure implementation.

### *Action 7: Develop and implement a partnered education and outreach program*

While this action will not lead to direct GHG emission reductions, it is an important component of the strategy behind Measure W-1 and will help maximize the success of direct GHG reduction actions such as Actions 1 and 2. For example, education and outreach around composting and food waste reduction can

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<sup>56</sup> <https://www.calrecycle.ca.gov/blogs/in-the-loop/in-the-loop/2020/03/02/yolo-county-edible-food-recovery-kick-off>

<sup>57</sup> <https://www.drawdown.org/solutions/recycled-paper>

<sup>58</sup> <https://www.sanjoseca.gov/home/showdocument?id=198>

<sup>59</sup> <https://www.everycrsreport.com/reports/R40667.html>

provide the information needed by residents to start a home compost pile and/or reduce their overall waste. Providing these materials in English and Spanish will further the impacts of this action.

*Action 8: Develop and implement an inspection and compliance program*

Conducting inspection and compliance activities around the requirements of SB 1383 will help ensure the community is doing its best to achieve the desired organics waste reduction and edible food recovery targets, thereby supporting the GHG emission reductions inherent to Actions 1 and 2.

## 6 Sequestration

A carbon neutral future includes carbon sequestration mechanisms which take carbon out of the atmosphere. The best technology cities have for achieving higher rates of carbon sequestration is through increasing the urban tree canopy by planting more trees and greenscaping. The CAP measure supporting this goal will do just that – increase carbon sequestration through greenscaping programs. The primary action under this measure is implementing Chico’s Urban Forest Revitalization Program, which establishes tree planting goals for the future. The details of each action supporting the carbon sequestration measure, and evidence of their GHG reduction potential, are included below.

### Measure S-1: Increase carbon sequestration by increasing urban canopy cover at least 10% by 2030 through new greenscaping programs

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Implement Chico’s Urban Forest Revitalization Program:</b> Implement the Urban Forest Revitalization Program to plant 700 trees by March 2022 (adopted) and 4,500 trees by 2030 (new goal). Focus on areas of the City with low tree canopy cover based on canopy map and optimize carbon sequestration through management of the existing urban forest.	2030: 260 2045: 260
2	<b>Increase greenspace in Chico:</b> Identify and participate in partnership opportunities necessary to convert public and private spaces into greenspace and increase the City’s carbon sequestering greenspace by 2030.	Supportive
3	<b>Improve greenspace management to maximize carbon sequestration:</b> Improve management of public open space and park lands to maximize carbon sequestration. Through permit review, evaluate and ensure that landscaping plans utilize native species identified in the Urban Forest Management Plan where feasible.	Supportive
4	<b>Promote local wood use:</b> Develop protocols to promote local wood use to keep biomass out of the landfill and to extend the carbon sequestration benefits of trees in long-term wood products.	Supportive
5	<b>Require shade trees in new major developments:</b> Require home construction in new developments to include shade trees for enhanced energy savings. Trees should be located on the east, west, or south face of the home to prevent interference with installed solar PV paneling. Tree species and location would be determined in coordination with the Planning Commission.	Supportive

#### Action 1: Implement Chico’s Urban Forest Revitalization Program

Chico’s Urban Forest Revitalization Program identifies the goal of planting 700 trees by March 2022 in currently identified low-income communities with low tree canopy cover. Action 1 extends the goals of this program with the additional goal of planting 4,500 trees by 2030. As of September 2020, the City has identified approximately 9,000 tree planting locations in its Right-of-Way, suggesting that an even higher tree planting goal could be set for 2045. Emission reduction calculations associated with this action assume that both the 2022 and 2030 tree planting goals will be met, and that the carbon sequestration potential for seedlings averaged over 40 years is about 0.058 MT CO<sub>2</sub>e per tree per year. This number is

an average of the 40-year carbon sequestration potential for four common tree species already being planted in Chico: red oak, black tupelo, valley/white oak, and red maple.<sup>60</sup>

Calculations		
Year	2030	2045
Trees Planted <sup>1</sup>	4500	4500
<b>Total Reductions (MT CO<sub>2</sub>e)<sup>2</sup></b>	<b>261</b>	<b>261</b>
<sup>1</sup> Per the City's Urban Forest Revitalization Program <sup>2</sup> Assuming a carbon sequestration potential of 0.057979 MT CO <sub>2</sub> e/tree/year; an average of four common municipal tree types (red oak – 0.05268 MT CO <sub>2</sub> e/tree/year, black tupelo – 0.03816 MT CO <sub>2</sub> e/tree/year, valley/white oak – 0.08466 MT CO <sub>2</sub> e/tree/year, and red maple – 0.05641 MT CO <sub>2</sub> e/tree/year). <a href="https://planting.itreetools.org/app/report/">https://planting.itreetools.org/app/report/</a>		

*Actions 2-5: Increase greenspace, improve greenspace management to maximize carbon sequestration, promote local wood use, & require shade trees in new major developments*

In addition to the concrete tree planting goals the City has established under Action 1, Actions 2-5 will help create additional carbon sequestration potential for the City. However, emission reductions from these actions are not quantified, due to the difficulty in determining the exact impact these actions will have on GHG emissions in Chico. As the City moves forward in implementing these actions, an updated inventory will help quantify their impacts.

Past efforts to increase greenspace include efforts to develop multiple community gardens. Staff collaborated with a CSUC class to develop an inventory of sites appropriate for community gardens and shared the results with local, interested parties. In 2012, the City collaborated with BEC to develop a 1-acre community garden on the City-owned vacant property at Notre Dame and Humboldt Avenue. In 2014, BEC developed another community garden on City-owned property on Nord Avenue. There are 3 farmers markets, two year-round, that operate within the city.

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<sup>60</sup> <https://planting.itreetools.org/app/report/>



## 7 Water

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While water emissions are not accounted for separately in the City's inventory, residential and commercial water usage generally accounts for only a small portion of a community's emissions through the use of electricity to pump and distribute water and through water and wastewater treatment. However, water conservation is an important aspect of a community's overall sustainability and resiliency and this CAP Update supports the community's general water conservation goals and work. To this end, one supportive water measure has been identified: promote and support water conservation within the community.

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**Measure W-1: Promote and support water conservation within the community**

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Encourage use of greywater and rainwater systems:</b> Encourage residential use of greywater and rainwater systems by providing informational materials to residents and businesses on the advantages of these systems.	Supportive
2	<b>Encourage and promote permeable surfaces:</b> Encourage installation of permeable surfaces for new development hardscapes and for major retrofits. Promote alternatives driveways, sidewalk materials, and greenscaping through education programs.	Supportive
3	<b>Implement and enforce WELO standards:</b> Continue to implement the California’s Water Efficient Landscape Ordinance (WELO).	Supportive

*Actions 1-3: Encourage greywater, rainwater, permeable surfaces, and comply with WELO*

Actions 1-3 will support emission reductions in the water sector and increase the overall sustainability and resiliency of the Chico community. Greywater systems save water by reusing household wastewater before sending it to the wastewater treatment plant. Rainwater systems take advantage of naturally-occurring clean water – rain – and put it to use for household water usage. Both systems help decrease throughputs at the wastewater treatment plant and associated transport and processing emissions. Permeable surfaces help increase water infiltration for groundwater recharge, contributing to healthier groundwater tables and stormwater systems, and can reduce the need for irrigation for landscaping. Finally, the California Water Efficient Landscaping Ordinance (WELO) increases water efficiency in both new and existing development statewide. The City will continue to incorporate WELO into all new development projects as part of the development review and Building Permit process.

Chico has a demonstrated track record in achieving water efficiency goals. As a response to the California 20 x 2020 Water Conservation Plan, which aimed to reduce per capita urban water use by 20% by the year 2020, Chico water customers were asked to use less water than they did in 2014. By the end of 2015, water usage was reduced 29% from 2013 levels. This suggests that the City can achieve increased water conservation through encouragement and promotion of the programs contained in this CAP Update.

## 8 Outreach and Education

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A coordinated outreach and education effort is an important part of any CAP to provide the information and context to the community that is necessary for successful measure implementation. Most measures included in the CAP have a measure-specific outreach, education, and promotion component; the purpose of the outreach and education measure included here is to provide over-arching promotion for why the City has a CAP and how the CAP's big-picture strategies will help decrease emissions and improve life in Chico. During the CAP development process, the City identified many potential partners in developing measure-specific outreach and education programs. These partners will be crucial in the over-arching outreach and education efforts included here as well.

**Measure O-1: Conduct a wholistic community outreach and education program to optimize CAP implementation**

Action #	Action	Anticipated Reduction (MT CO <sub>2</sub> e)
1	<b>Conduct partnered community outreach and education:</b> Develop a plan for ongoing community outreach strategies to maintain education and promotion of the CAP. This includes regular maintenance of the City’s CAP webpage and ongoing PR, working with CUSD to create K-12 lesson plans, and partnering with CSUC and non-profits.	Supportive

*Action 1: Conduct partnered community outreach and education*

This action will serve as an umbrella for all education, outreach, and promotion actions under each emissions sector, and will help promote the CAP within the community and ensure the CAP is implemented equitably. A coordinated and partnered outreach and education program will help increase buy-in among community members and educate residents, business-owners, and students in Chico about doing their part to reduce emissions within the community.

The City has already established a good track record to support this Action. The City has participated in CSUC’s This Way to Sustainability conference and attends other meetings and conferences locally that address issues effecting the environment, economy, and social equity. City employees often are invited to speak at CSUC classes on the topics of environment, economy, and social equity.