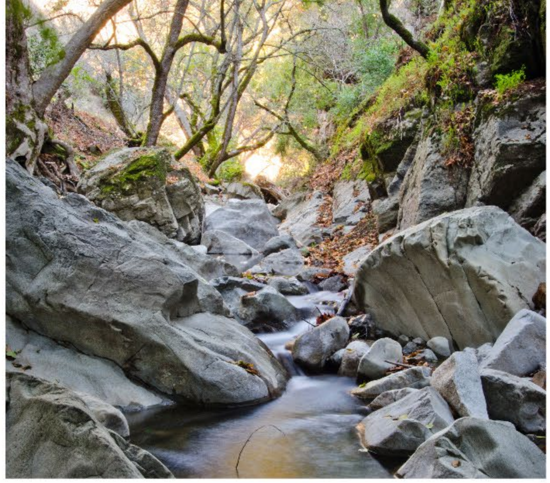


Valley Water

March 2026

FINAL DRAFT

Greenhouse Gas Reduction Plan

PREPARED FOR:
Santa Clara Valley Water District

Water Resources Planning and Policy Unit
5750 Almaden Expressway
San Jose, CA 95118

FINAL DRAFT

Greenhouse Gas Reduction Plan

PREPARED FOR

Santa Clara Valley Water District
Water Resources Planning and Policy Unit
5750 Almaden Expressway
San Jose, CA 95118

PREPARED BY

Ascent Environmental, Inc. dba Ascent
455 Capitol Mall, Suite 300
Sacramento, CA 95814
Brenda Hom,
Project Manager

MARCH 11, 2026

PREPARED BY

Ascent

Brenda Hom, Project Manager

Fred Hochberg, Technical Lead

Honey Walters, Principal

Valley Water

Samantha Greene, *Water Resources Planning and Policy Manager*

Sarah Young, *Senior Project Manager*

Nick Mascarello, *Associate Environmental Planner*

Plan Contributors and Implementation Leads

Tony Leonardo, *Facilities Management Unit*

Frank Chesonis, *Equipment Management Unit*

Emily Scanlan, *Equipment Management Unit*

Carlos Avila, *Facilities Management Unit*

John Brosnan, *Utility Electrical and Control Systems Unit*

Brendan Maher, *Utility Electrical and Control Systems Unit*

Jing Wu, *Water Supply Planning and Conservation Unit*

Todd Sexauer, *Dam Safety Environmental Services Unit*

Tiffany Chao, *Dam Safety Environmental Services Unit*

Wendy Young, *Dam Safety Environmental Services Unit*

Justin Burks, *Water Supply Planning and Conservation Unit*

Brian Mendenhall, *Operations and Maintenance Environmental Support Unit*

Jeffrey Lewis, *Operations and Maintenance Environmental Support Unit*

Patrick Carter, Construction Services Unit

Under the Direction of

Lisa Bankosh, *Assistant Officer, Watersheds Stewardship and Planning Division*

Acknowledgements

GEI Consultants

Ryan Jolley, *Contract Manager*

Peer Reviewers

Metropolitan Water District

Malinda Stalvey, Program Manager

Rincon Consultants Inc.

Ryan Gardner, Director of Climate Action

Emily Saul, Climate Planner

TABLE OF CONTENTS

Appendices

List of Figures

List of Tables

LIST OF ABBREVIATIONS

AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
BMP	best management practice
CAP	climate action plan
CCAP	climate change action plan
CCUS	carbon capture, utilization, and storage
CEQA	California Environmental Quality Act
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CVWD	Coachella Valley Water District
GHG	greenhouse gas
GHGRP	greenhouse gas reduction plan
GWP	global warming potential
IPCC	Intergovernmental Panel on Climate Change
$MTCO_2e$	metric tons of carbon dioxide equivalent
MWD	Metropolitan Water District of Southern California
N_2O	nitrous oxide
PRWPA	Power and Water Resources Pooling Authority
SB	Senate Bill
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
VMT	vehicle mile traveled
ZEV	zero-emission vehicle

This page is intentionally left blank.

1 INTRODUCTION

The Santa Clara Valley Water District (Valley Water) supplies clean and safe water, provides flood protection, and serves as a steward of streams on behalf of Santa Clara County's 1.9 million residents. The effects of climate change, including warmer temperatures, changing precipitation and runoff patterns, reduced snowpack, and rising sea levels, challenge Valley Water's ability to provide these services. Managing climate change-related uncertainties, vulnerabilities, and risks to local communities, water resources, and water supplies is critical to fulfilling Valley Water's mission. The mitigation of greenhouse gas (GHG) emissions in this greenhouse gas reduction plan (GHGRP) supports Valley Water's mission to act as an environmental steward.

The GHGRP aims to reduce Valley Water's emissions and achieve a carbon neutrality target by 2045. This target aligns with the State of California's goals under Assembly Bill (AB) 1279, signed by Governor Newsom in 2022. The GHGRP updates an inventory of Valley Water's GHG emissions through 2021, a forecast of future GHG emissions, and a list of measures to achieve a goal of net zero emissions by 2045. It provides specific implementation steps as well as metrics to measure progress.

This GHGRP aligns with the framework outlined under the California Environmental Quality Act (CEQA) Guidelines Section 15183.5. The intent is to provide a "CEQA-qualified" plan, adopted by the Board of Directors to streamline GHG analyses and support incorporating reduction measures needed in project-specific CEQA documents.

1.1 BACKGROUND AND PURPOSE

In 2021, Valley Water adopted its climate change action plan (CCAP) (Valley Water 2021a). The CCAP established a guide for Valley Water to respond to climate change through adaptation and mitigation. Climate mitigation focused on reducing GHG emissions, including those emitted by Valley Water operations from 2010 through 2017, excluding emissions from construction and other sources. Additionally, the CCAP called for preparing a qualified GHGRP that meets the requirements of the CEQA Guidelines Section 15183.5. Chapter 2 provides more details on CEQA-qualified plans.

Given the State's latest target to achieve carbon neutrality statewide by 2045 under AB 1279, the direction in the CCAP, and the framework outlined under CEQA Guidelines Section 15183.5, this GHGRP has the following objectives:

- Update Valley Water's GHG emissions inventory to include historical years 2017 through 2021 to support emissions forecasts for 2030 and 2045;
- Establish a carbon budget that supports a carbon neutrality target by 2045 consistent with State GHG targets under AB 1279;
- Develop new and refined GHG reduction measures that, if implemented, would help Valley Water achieve the GHG reduction targets;
- Develop an implementation and monitoring plan to ensure the progress of the reduction measures;
- Develop a CEQA Streamlining Checklist for future projects that may tier from the GHGRP;
- Be adopted through a public process following environmental review.

Valley Water intends for the GHGRP to provide CEQA streamlining for future Valley Water construction activity through 2045, whose environmental documents, such as Environmental Impact Reports, have not yet gone through the public review process and/or do not already include actions to achieve net zero greenhouse gas emissions. Hence, the forecast of construction emissions is necessary for this GHGRP.

This GHGRP does not discuss the impacts of climate change on the Santa Clara Valley or Valley Water's actions to adapt to climate change. These items are discussed in the 2021 CCAP.

This document also organizes emissions in terms of scope. The scope of emissions sources indicates an entity's level of control over the sources. The three emissions scopes are described as:

- Scope 1: Emissions under the reporting entity's direct control (e.g., methane emissions from natural gas combustion in buildings, fuel combustion in the district-owned fleet, and refrigerant leakage).
- Scope 2: Emissions generated by purchased energy, where the actual energy generation source is outside the inventory boundary, but the use of that energy is within the inventory boundary (e.g., grid-purchased electricity).
- Scope 3: All other emissions sources that are not Scope 1 or Scope 2 sources. Valley Water’s Scope 3 emissions include business travel, construction, water imported from the State Water Project (SWP), employee commute, wastewater, solid waste, and contracted sediment hauling.

1.2 VALLEY WATER’S COMMITMENT TO GHG REDUCTION

Since 2008, Valley Water has committed to reducing GHG emissions. A partial list of its progress to date is provided below. Measures in this GHGRP are intended to go above and beyond these efforts.

- Since 2016, Valley Water has procured zero-emission power for its facilities from the Power and Water Resources Pooling Authority (PWRPA) via the Zero Carbon Water portfolio. PWRPA provides over 94 percent of Valley Water facilities’ electricity usage. Due to this and ongoing reductions in the carbon intensity of other grid-based electricity under the State’s Renewable Portfolio Standards, total emissions from Valley Water’s electricity consumption have fallen by over 94 percent since 2016.
- Valley Water is committed to water conservation to reduce per capita water use in its service territory. Water conservation provides numerous benefits, including reducing GHG emissions by avoiding energy usage for conveyance and treatment of additional water supply, increased drought resilience, cost savings, and ecosystem function. Valley Water’s long-term savings target is to achieve approximately 99,000 acre-feet per year (AFY) in water savings by 2030, 109,000 AFY by 2040, and 126,000 AFY by 2050 (Valley Water 2019: 25 and A-5, Valley Water 2024a). As of fiscal year 2023, Valley Water’s Water Conservation Programs and policies have saved 83,174 acre-feet per year (Valley Water 2024b: 93).
- Valley Water implements and provides grants and partnership funding for riparian and wetland habitat enhancement and restoration projects throughout the South San Francisco Bay (South Bay). By restoring native habitats and removing invasive species, Valley Water has expanded carbon sequestration while preserving or enhancing ecosystem health.
- Valley Water provides a telework program and commuter benefits that reduce its employees' commuting emissions. Valley Water employees also maintain the Green Team Employee Resource Group, which promotes sustainable practices through lifestyle changes and workplace improvement.
- In addition to decarbonizing its operations, Valley Water supports countywide programs to reduce GHG emissions. For instance, Valley Water contributed to the Countywide green business program and promoted best practices for energy management, water efficiency, pollution prevention, waste minimization, recycling, and material reuse.

2 CEQA-QUALIFIED GREENHOUSE GAS REDUCTION PLAN

As part of the CEQA process, a lead agency must determine if discretionary projects' GHG emissions result in a significant impact. According to the CEQA Guidelines, "the determination of the significance of GHG emissions calls for careful judgment by the lead agency…" (Section 15064.4(a)). Across the San Francisco Bay Area, many project CEQA analyses use the Bay Area Air District, formerly known as the Bay Area Air Quality Management District, significance thresholds to determine whether a project has a significant impact from GHGs. Bay Area Air District's thresholds focus on emissions from the operation of new land use projects meeting specific design criteria (e.g., no natural gas appliances in new buildings) (Bay Area Air District 2022). However, most of Valley Water's discretionary projects are related to infrastructure improvements that generally do not result in new operational emissions beyond Valley Water's ongoing maintenance of its assets. Bay Area Air District also allows projects to determine significance based on consistency with a qualified plan per CEQA Guidelines Section 15183.5.

Valley Water intends for the GHGRP to meet the qualifications outlined in Section 15183.5(b)(1) of the CEQA Guidelines (See Box 1) to streamline the determination of significance during the environmental review of future capital improvement projects (CIPs) that demonstrate consistency with the GHGRP. Questions a) and b) under part VIII (Greenhouse Gas Emissions) of Appendix F of the CEQA Guidelines question if a project would "[g]enerate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment" and if it would "[c]onflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases." A project consistent with the GHGRP can conclude, under both questions, that the project would have a less than significant impact on greenhouse gas emissions.

To determine project consistency with the GHGRP, this document includes a GHGRP Consistency Review Checklist (see Appendix B). Project managers can use the Checklist to determine whether a proposed Valley Water project is consistent with the GHGRP and, thereby, determine its CEQA GHG impact. The checklist provides a streamlined review process for projects subject to discretionary approval that prompts environmental review under CEQA. Projects that demonstrate consistency with the GHGRP may be able to conclude that they cause no additional significant environmental effects with respect to GHG emissions and climate change in their CEQA review. According to CEQA Guidelines Section 15183.5:

a) Lead agencies may analyze and mitigate the significant effects of greenhouse gas emissions at a programmatic level, such as in a general plan, a long range development plan, or a separate plan to reduce greenhouse gas emissions. Later project-specific environmental documents may tier from and/or incorporate by reference that existing programmatic review.

b) Public agencies may choose to analyze and mitigate significant greenhouse gas emissions in a plan for the reduction of greenhouse gas emissions or similar document. A plan to reduce greenhouse gas emissions may be used in a cumulative impacts analysis as set forth below. Pursuant to sections 15064(h)(3) and 15130(d), a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.

In addition, under CEQA Guidelines Section 15183.5, a CEQA-qualified GHG reduction plan must consist of the following attributes, which are covered under the objectives of this GHGRP:

- Quantifies GHG emissions, both existing and projected over a specified period, resulting from activities within a defined geographic area;
- Establishes a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;
- Identifies and analyzes GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- Specifies 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 levels; and
- Is adopted in a public process following the preparation and adoption of CEQA documentation corresponding to the GHG reduction plan.
- Projects that do not demonstrate consistency may, at Valley Water's discretion, include a more comprehensive project-specific analysis of GHG emissions consistent with CEQA requirements.

CEQA Guidelines Section 15382 defines a "significant" impact as "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." To determine whether a Valley Water project has a significant impact from GHG emissions, the project must not cause Valley Water to exceed its GHG reduction target.

What Projects Can Tier from the GHGRP?

- New projects that have not yet undergone public review of their CEQA documents are eligible to be tiered from the GHGRP.

And

- Projects that are currently under CEQA review and have not yet been adopted may choose to tier from this document.

3 REGULATORY CONTEXT

Below is a partial list of the primary guiding policies the State of California adopted to achieve its climate goals, in addition to supporting guidelines from the Bay Area Air District. These policies inform Valley Water's emissions forecasts and the development of Valley Water's GHG reduction targets.

- **Executive Order (EO) S-3-05 (2005)** directs California to reduce statewide GHG emissions to 1990 levels by 2020 and 80 percent below 1990 levels by 2050.
- **Assembly Bill (AB) 32**, the **Global Warming Solutions Act of 2006**, established regulatory requirements to reduce statewide emissions to 1990 levels by 2020 and gave the California Air Resources Board (CARB) the authority to develop regulations and market mechanisms necessary to achieve these reductions. AB 32 also established the State's first Climate Change Scoping Plan to establish a pathway for achieving the statewide emission reduction goals. The State met AB32's 2020 target in 2017, four years earlier than mandated (CARB 2024a).
- **Senate Bill (SB) 32 (2016)** requires that CARB ensures GHG reductions of 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.
- **AB 1279 (2022)** requires California to achieve net zero GHG emissions as soon as possible but no later than 2045 and maintain net negative GHG emissions thereafter. By 2045, anthropogenic(human-caused) GHG emissions must be reduced by at least 85 percent below 1990 levels.
- **CARB's December 2022 Scoping Plan** provides a path to achieving the AB 1279 targets, including analyses of specific emissions sectors such as building decarbonization and electric vehicle deployment.
- **Bay Area Air District's 2022 CEQA Guidelines** include guidance for local government-qualified GHG reduction plans. The guidance clarifies the requirements under CEQA Guidelines Section 15183.5 and recommends, in support of AB 1279, that local governments demonstrate a 40 percent reduction below 1990 levels by 2030 and be able to demonstrate that they will "achieve as ambitious emissions reductions as technologically and financially feasible by 2045, minimizing the residual amount of emissions needed to close the gap to carbon neutrality" (Bay Area Air District 2022). The 2022 CEQA Guidelines do not include thresholds of significance specifically for construction-related GHG emissions. Instead, Bay Area Air District continues to encourage the use of best management practices to minimize construction-related GHG emissions.

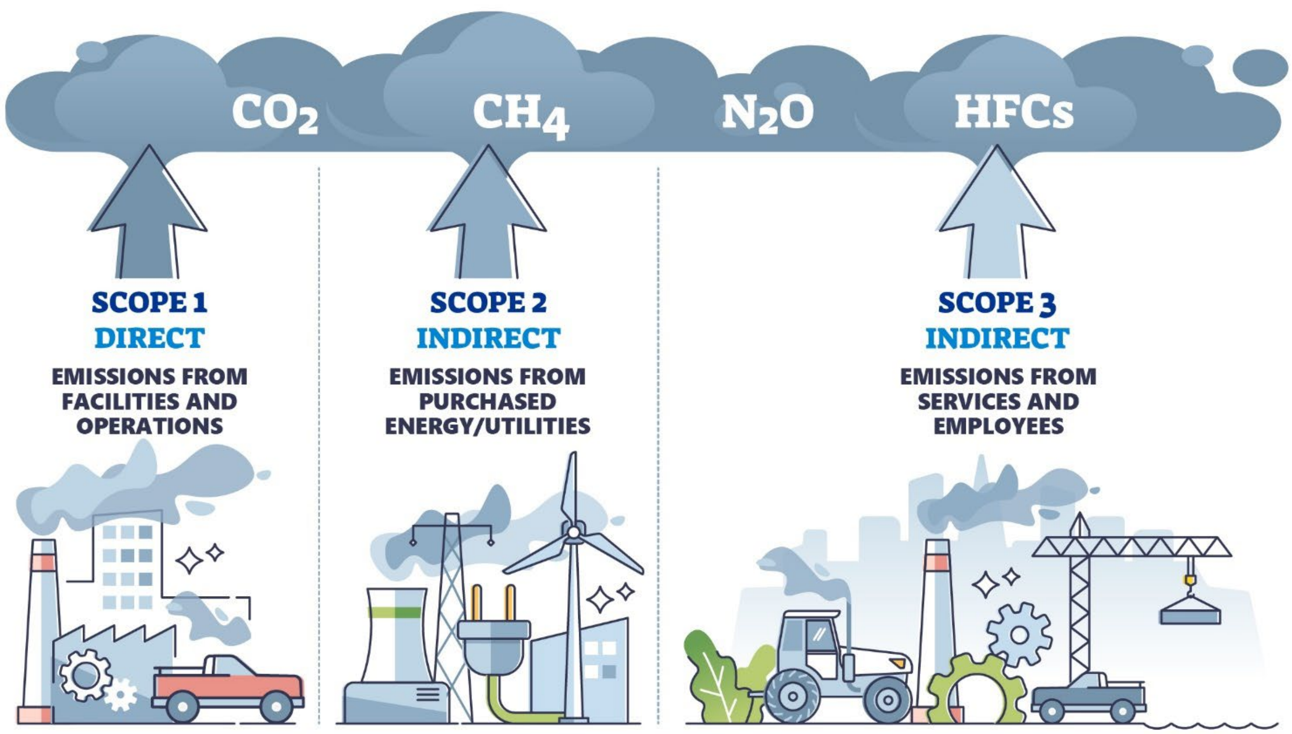
4 GHG EMISSIONS INVENTORY

This chapter presents Valley Water's updated GHG emissions for calendar years 2017 through 2021 and forecasts for 2030 and 2045. It updates the 2021 CCAP's GHG estimates, which presented emissions from 2010 to 2017, and adds additional emissions from sectors that were not accounted for in the CCAP owing to limited data availability: construction, solid waste, high-global warming potential (GWP) gases, employee-generated wastewater, and sediment hauling. GWPs for the respective GHGs estimated in this section are derived from the Intergovernmental Panel on Climate Change's (IPCC's) Sixth Assessment Report (Greenhouse Gas Protocol 2024).

4.1 EMISSIONS SCOPES

For tracking purposes, emissions fall under one of three "scopes," which the US Environmental Protection Agency defines as follows and illustrated in Figure 1:

- **Scope 1 (Direct Emissions):** Direct emissions that occur from sources controlled or owned by an organization (e.g., emissions associated with fuel combustion in on-site boilers, furnaces, and vehicles directly controlled by the organization).
- **Scope 2 (Indirect Emissions):** Indirect emissions associated with purchasing electricity, steam, heat, or cooling. (Valley Water does not purchase steam, heat, or cooling from third parties, so only electricity purchases are included in this GHGRP).
- **Scope 3 (Indirect Emissions):** Indirect emissions from activities from assets not owned or controlled by the reporting organization, but that the organization indirectly affects its value chain (EPA 2023).



Source: Prepared by Ascent in 2025.

Figure 1 Emission Scopes

An emission's scope is highly related to an organization's degree of control over a particular sector. Valley Water generally has more control over Scope 1 and 2 emissions because it directly controls Scope 1 sources and has discretion over its Scope 2 electricity purchases (i.e., it can choose to buy or not buy a low-carbon electricity product). Scope 3 emissions, in contrast, are indirect and come from non-Valley Water entities. Valley Water can persuade and influence these entities (e.g., via outreach to employees to reduce waste disposal, implementing countywide water conservation programs, or contracting policies for new construction that incentivize GHG reductions), but cannot directly control them. Despite the lack of direct control over Scope 3 emissions, Valley Water is committed to including and mitigating as many sources of the district's emissions as possible, including those from Scope 3. Table 1 describes Valley Water's specific emissions sectors and their associated scope.

Table 1 Valley Water Included Emissions Sectors by Scope

Scope	Emissions Sector	Description
1	Natural Gas Use in Buildings	Valley Water buildings (e.g., offices, pumping plants, and water treatment plants) combust natural gas for space and water heating.
	On-Road Fleet	Valley Water owns and operates on-road vehicles to transport employees and perform maintenance on its assets. Many of these vehicles consume gasoline.
	Off-Road Fleet	Valley Water owns and operates construction equipment and other off-road heavy-duty equipment for infrastructure and stream maintenance that consume diesel.[1]
	High GWP Gases	Refrigerants are the primary high-GWP gases used by Valley Water for building and vehicle cooling. These annual purchases correspond to the annual leakage of these refrigerants into the atmosphere. The high-GWP gases associated with refrigerants can be thousands of times as potent as CO_2 in warming the atmosphere.
2	Facility Electricity Use	Valley Water facilities, buildings, and equipment consume electricity procured from PWRPA, PG&E, SJCE, and SVP. Electricity use is primarily from operating facilities and equipment, including water treatment plants, the Silicon Valley Advanced Water Purification Center, pumping plants, and lighting, appliances, air conditioning, plug loads, and on-site EV charging stations at offices and facilities. Facility electricity use emissions include emissions associated with the conveyance and treatment of water within Santa Clara County conducted by Valley Water.
3	Imported Water	Valley Water imports water from the SWP and CVP. Water extraction and conveyance[1] consume electricity, which in turn results in emissions.
	Employee Commute	Valley Water employees commute to work in light-duty vehicles, which generally combust gasoline or use electricity.
	Business Travel	Valley Water employees use a combination of passenger cars (which combust gasoline or use electricity) and aircraft (which combust aviation gasoline) for business travel.
	Construction	Valley Water's capital improvement projects produce emissions through contracted activities such as operation of construction equipment, hauling of materials, and construction worker commute.[1]
	Solid Waste	Valley Water facilities generate landfilled materials that decompose and produce methane.
	Wastewater	Valley Water facilities generate wastewater. Anaerobic decomposition of this wastewater produces methane.
	Sediment Hauling	Valley Water performs sediment management to remove accumulated sediment from waterways and maintain the conveyance capacity of creeks. This work involves contracting with third-party companies that use dump trucks to haul sediment from the job site to nearby landfills as needed. The dump trucks consume diesel.

Notes: GWP = global warming potential, PG&E = Pacific Gas & Electric, PWRPA = Power and Water Resources Pooling Authority, SJCE = San Jose Clean Energy, SVP = Silicon Valley Power, EV = electric vehicles, SWP = State Water Project, CVP = Central Valley Project, CH4 = methane, GHG = greenhouse gas.

1 Valley Water construction projects use a combination of Valley Water-owned and operated construction off-road equipment as well as contracted construction equipment. Emissions from construction activities performed by fleet vehicles and equipment owned by Valley Water are included in Scope 1. Emissions from contracted construction activities are included in Scope 3.

Source: Prepared by Ascent in 2024.

1 Extraction is defined as taking the water from its point of origin, such as a river or aquifer, and conveyance is defined as moving the water from the river or aquifer to its destination—in this case, to Valley Water's service area.

The statewide policies and regional guidelines in Chapter 3 apply to Scope 1 and Scope 2 emissions captured in the State's emissions inventory. However, the policies and guidelines do not prescribe how entities within the state should reduce emissions from each scope. Due to the difference in the organizational and operational boundaries, emissions sources are categorized differently between the State's emissions inventory and inventories of smaller entities within the state, such as Valley Water. An entity such as Valley Water generates emissions from all three scopes, but all of these emissions would be categorized under the State's Scope 1 and 2 emissions because Valley Water functions entirely within the boundaries of the state. This includes using electricity and natural gas, burning fuel (e.g., Valley Water fleet, construction equipment, business travel), and importing water from within the state, therefore, these emissions occur as part of the State's Scope 1 and 2 emissions. Although the State itself does not include Scope 3 emissions relative to its own boundaries, Valley Water recognizes the importance of its own Scope 3 emissions from construction and other sources in the context of the State's carbon neutrality target by 2045. By integrating strategies that address all scopes within the agency's emissions inventory, Valley Water is creating a robust framework to reduce its carbon footprint and support statewide emissions reductions goals.

4.2 VALLEY WATER'S UPDATED GHG EMISSIONS INVENTORY

This section updates Valley Water's pre-2017 emissions to include data through 2021 and additional emissions sources, documenting trends over time and providing data to support emissions forecasting through 2045. At the time that inventory preparation began, 2021 was the most recent year with complete activity data available. Additionally, a new baseline emissions level was created that accounts for the latest 5-year average between 2017 and 2021. Figure 3 shows the updated historical trend of Valley Water's emissions from 2014 to 2021. Although the CCAP included emissions between 2010 and 2017, data between 2010 and 2014 were excluded in this update due to poor data quality. Based on these results, Valley Water emissions have generally declined since 2014, and especially since the agency began purchasing zero-carbon emission electricity in 2016 through a Zero Carbon Water Portfolio purchase agreement with the Power and Water Resources Pooling Authority (PRWPA).

Given the significant change in the emissions portfolio starting in 2016, this inventory uses emissions from calendar years 2017 through 2021 as a baseline level. This five-year average baseline was selected to normalize year to year variation in emissions from Valley Water's operations . For example, the amount of imported water delivered to Valley Water fluctuates annually depending on hydrological conditions. Using a single year for an emissions inventory could capture a year with an unusually high or low quantity of imported water (and its associated emissions), thus substantially overstating or understating Valley Water's typical emissions.

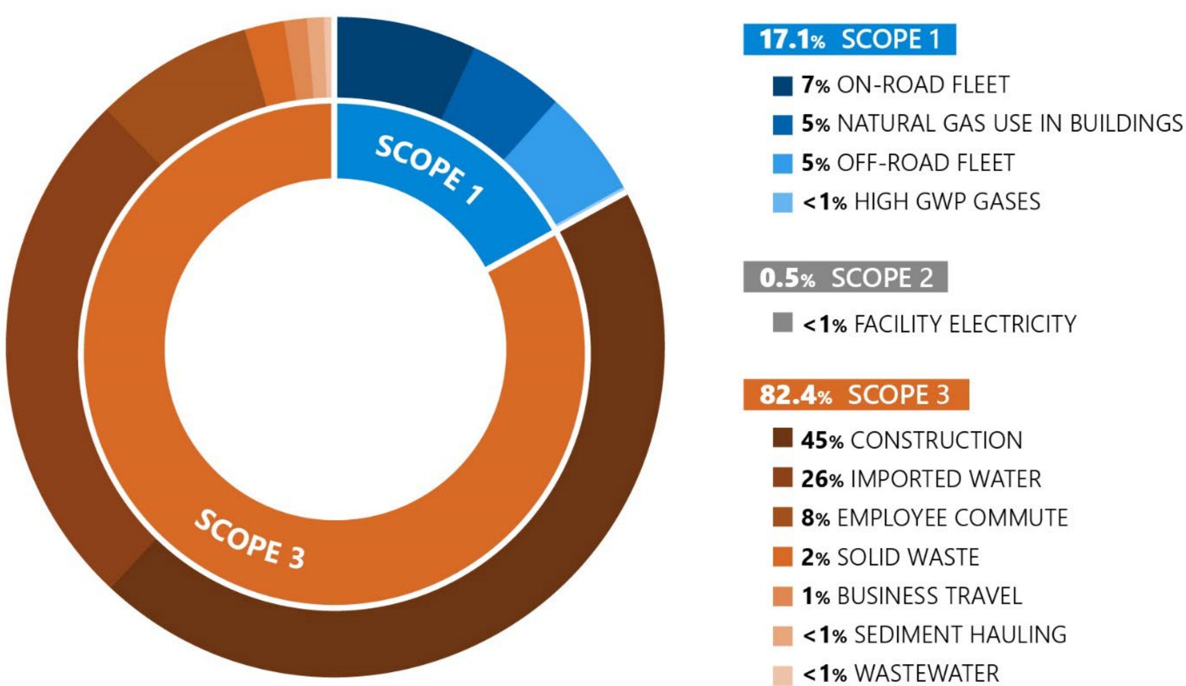
As shown in Table 2 and Figure 2, Valley Water's operations generated an average of 15,399 metric tons of carbon dioxide equivalent ($MTCO_2e$) per year between 2017 and 2021.

Table 2 2017-2021 Valley Water GHG Emissions Inventory by Scope and Sector

Scope	Sector	Average GHG Emissions ($MTCO_2e$)	Percent of Total
1	On-Road Fleet	1,102	7.2%
	Natural Gas Use in Buildings	745	4.8%
	Off-Road Fleet	703	4.6%
	High GWP Gases	79	0.5%
	Scope 1 Total	2,630	17.1%
2	Facility Electricity	84	0.5%
	Scope 2 Total	84	0.5%
3	Construction	6,990	45.4%
	Imported Water	4,022	26.1%
	Employee Commute	1,219	7.9%
	Solid Waste	236	1.5%
	Business Travel	147	1.0%
	Sediment Hauling	62	0.4%
	Wastewater	9	0.1%
	Scope 3 Total	12,686	82.4%
Total		15,399	100.0%

Notes: GWP = global warming potential, $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable, kg= kilogram

Source: Prepared by Ascent in 2025.



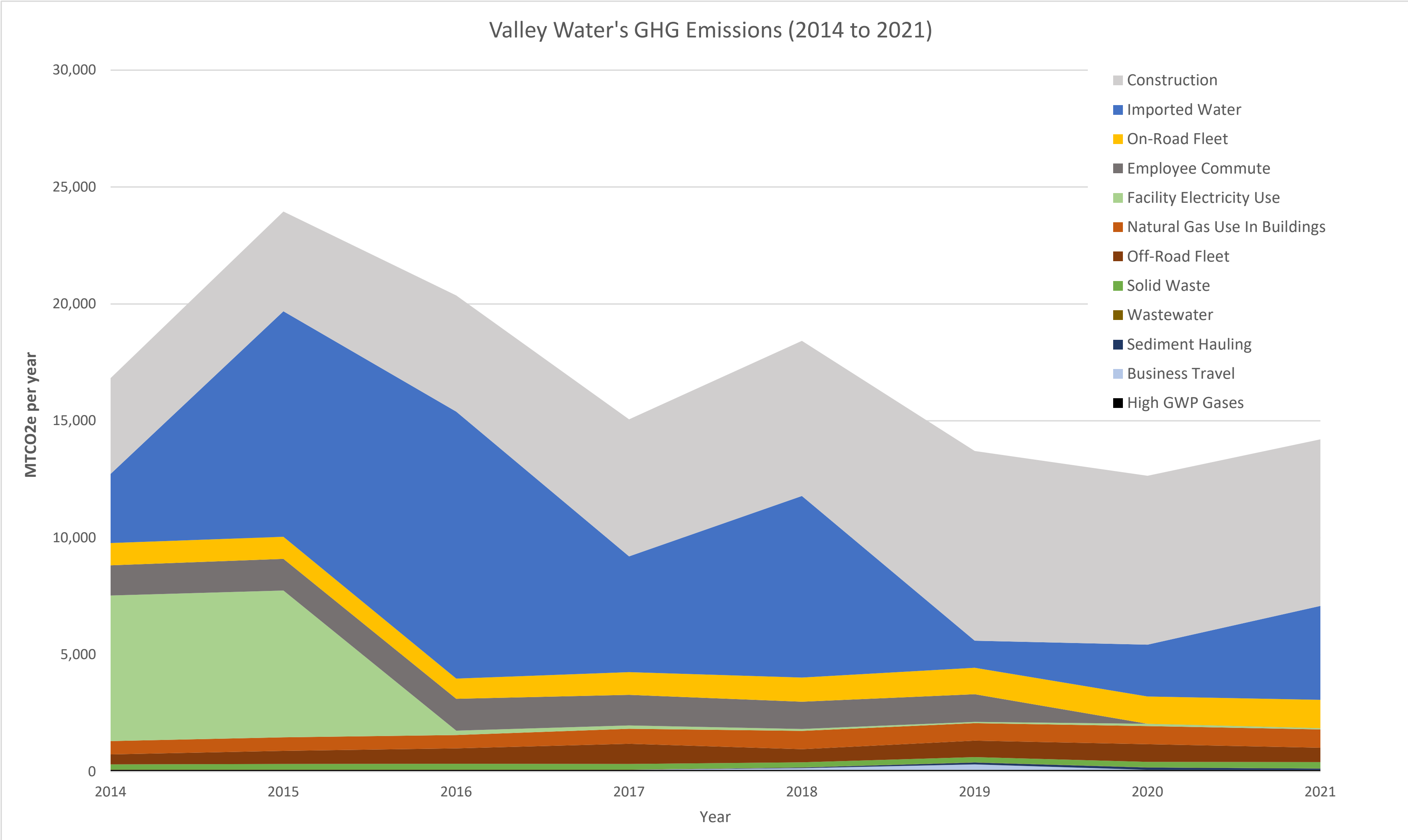
Source: Prepared by Ascent in 2025.

Figure 2 Valley Water Greenhouse Gas Baseline Emissions (2017-2021 Average)

Scope 3 emissions account for 82 percent of Valley Water's baseline emissions, with 45 percent of Scope 3 generated by construction-related activities and 26 percent of Scope 3 from imported water. Because the CCAP did not include construction emissions, their addition in this GHGRP increased Valley Water's emissions inventory relative to the CCAP, with construction emissions accounting for between 40 to 60 percent of Valley Water's baseline emissions. Solid waste, high-GWP gases, and wastewater, which were also not included in the CCAP, resulted in smaller increases of up to five percent of total emissions depending on the year.

Despite the overall increase relative to the CCAP's inventory, the baseline inventory update shows that Valley Water's annual emissions are on a downward trajectory over the past decade. Imported water (accounting for 56 percent of emissions in 2016) was the largest single source in 2016, but emissions from this sector have declined. This is primarily due to decreased GHG emission factors for the electricity used to pump and treat water, despite interannual variability in the volume imported[2]. By 2021, the imported water emissions factor declined to approximately 35 percent of its 2016 value as the SWP used increasing proportions of carbon-free electricity in its operations. Additional discussion of the baseline inventory data, calculation methodology, and results can be found in Appendices A and D.

[2] Although the quantity of imported water fluctuated as well over this time period due to hydrological conditions, there was no meaningful upward or downward trend in that quantity; thus, the drop in imported water emissions is largely due to the decline in electric emissions factors just described.



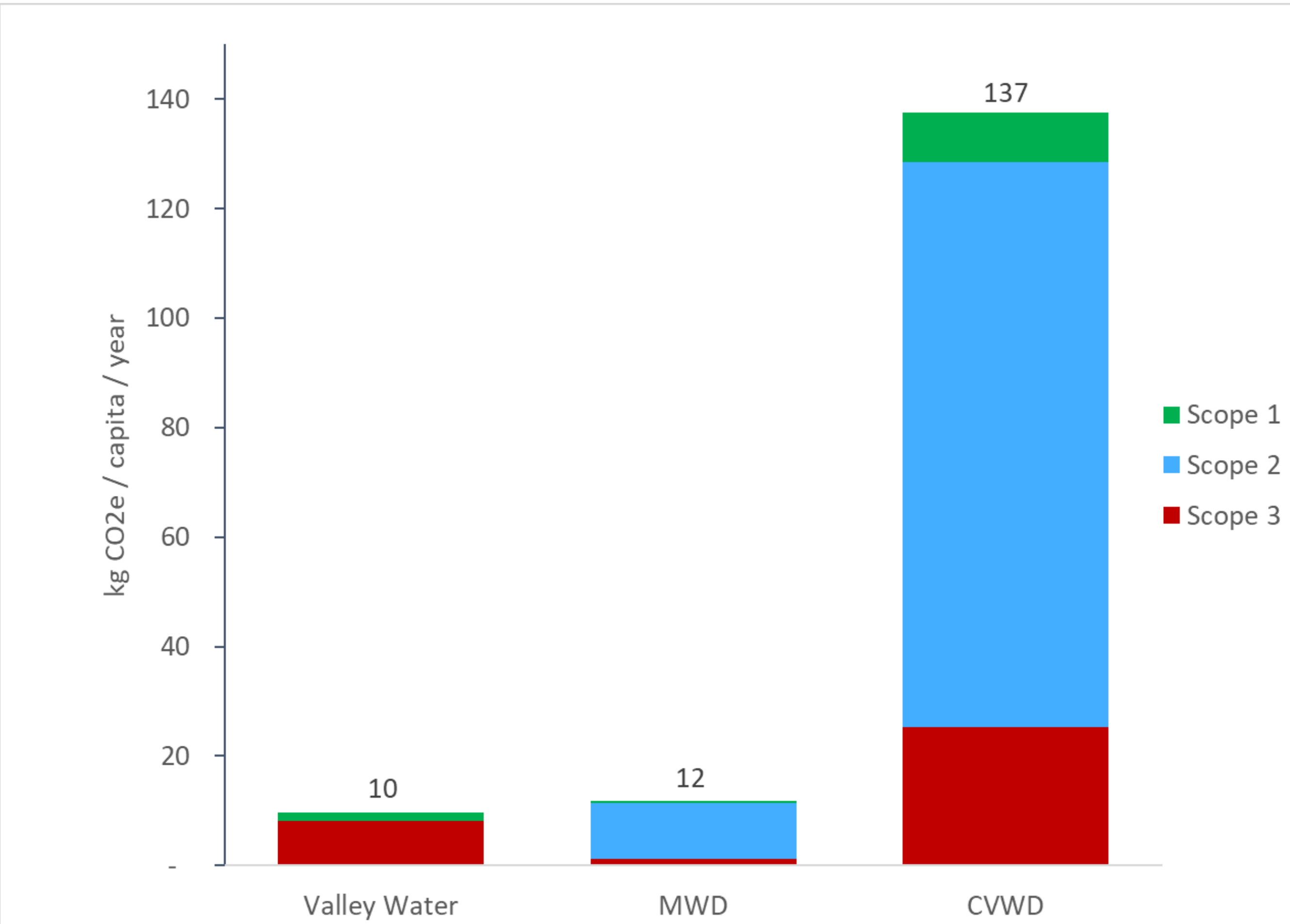
Notes: GHG = Greenhouse Gas, MT CO_2e = metric tons of CO_2-equivalent.

Source: Prepared by Ascent in 2025.

Figure 3 Valley Water Greenhouse Gas Emissions (2014 to 2021)

5 COMPARISON OF EMISSIONS INVENTORIES ACROSS WATER DISTRICTS

During the development of this GHGRP, the project team reviewed two other water district climate action plans (CAP), which are analogous to this GHGRP: the Coachella Valley Water District (CVWD) Climate Action and Adaptation Plan and the Metropolitan Water District of Southern California's (MWD's) Climate Action Plan (CVWD 2021, MWD 2022). This comparison helped to inform and contextualize Valley Water's inventory methodology, reduction goals, and measures among other water districts. Additionally, to account for differences in the scale of operations and population served by each district, the estimated annual GHG emissions between these districts are compared on a per-capita basis in Figure 4 below. Valley Water's per-capita emissions (2017-2021 average) are lower than MWD's reported 2017 emissions and substantially lower emissions than CVWD's 2016 to 2019 average emissions per capita. As shown in Figure 4, Valley Water also has the largest proportion of Scope 3 emissions relative to its annual emissions.



Notes: MWD = Metropolitan Water District of Southern California; CVWD = Coachella Valley Water District; kg CO_2e = kilograms of carbon dioxide equivalent.

[1] Emissions data from MWD (2022: 81) and CVWD (2021: 49); population data from Valley Water (2021b: 2), MWD (2022: 32), and CVWD (n.d.). To ensure comparability across these water districts, emissions related to wastewater treatment were removed from CVWD's totals, as Valley Water and MWD do not perform significant amounts of wastewater treatment.

Source: Prepared by Ascent in 2024.

Figure 4 Annual Average Emissions per Capita Comparison Across Water Districts

In addition to the quantitative GHG values above, the following qualitative assessments were made of these plans:

- MWD and CVWD's plans set a carbon neutrality goal by 2045 but note several caveats. MWD stated that emissions have high interannual variability because they depend heavily on pumping water supplies via the Colorado River Aqueduct, and thus, MWD uses a carbon budget-based approach (which measures total emissions over a range of years rather than reductions in a single year; see Chapter 7 for more details on Valley Water's carbon budget) to help achieve carbon neutrality (MWD 2022: ES.7). CVWD acknowledged that its suite of measures still resulted in emissions in 2045 and stated that future CAPs would have additional measures to achieve this goal (CVWD 2021: 53). However, both plans were finalized before the passage of AB 1279 in September 2022, which means that the State's carbon neutrality target by 2045 was not yet in effect.
- MWD and CVWD's plans describe emission reduction strategies for Scope 1, 2, and 3 emissions sources (See Chapter 4 for an explanation of emission scopes), including the phase-out of natural gas combustion and the replacement of internal combustion engine vehicles with zero-emission vehicles (CVWD 2021: ES-6 through ES-7 and MWD 2022: 5.1 through 5.22).
- Neither plan quantified the reduction potential of all GHG reduction measures. Both districts labeled some measures as "supportive" in reducing GHG emissions (CVWD 2021: ES-7 and MWD 2022: 5.1 through 5.22).
- Cost was an important issue, as water districts must balance the need for climate action with their ratepayers' need for affordable water. Therefore, CVWD removed measures from consideration that could result in a "significant" increase in costs (CVWD 2021: 54), and MWD committed to updating the implementation measures to balance impacts to the cost of providing water to its customers (MWD 2022: 5.3).
- Availability of technology dictated the pace and scale of climate action. For example, MWD divided its measures into "Phase 1" and "Phase 2." Phase 1 measures had already available technology, whereas Phase 2 measures required additional research and new or emerging technology (MWD 2022: ES.18).

6 VALLEY WATER'S GREENHOUSE GAS EMISSIONS FORECAST

To determine the level of GHG reductions needed to meet Valley Water's goals, it is necessary to forecast its emissions in future years. Two forecasts were developed for this GHGRP, a Business-As-Usual (BAU) and a legislative-adjusted forecast. The BAU forecast extrapolates from historical trends and assumes that no additional action is taken by Valley Water or local, State, or federal agencies to reduce GHG emissions. The legislative-adjusted forecast uses the BAU forecast as a starting point and accounts for the effects of the emissions-reducing policies detailed in Chapter 3. Both forecasts were developed based on trends identified in 2010-2021 data and consultation with subject matter experts at Valley Water on likely future trends in emissions drivers such as fuel usage, electricity usage, and construction activity.

6.1 LEGISLATIVE REDUCTIONS

In addition to the high-level State and regional policies and guidance listed in Chapter 3, the emissions forecast in this GHGRP considers the effects of specific emissions-reducing regulations, listed in Table 3 below. These are called "legislative reductions" and are assumed to reduce Valley Water's future emissions in specific sectors without any new actions from Valley Water.

Table 3 State of California Legislative Effects on Valley Water's GHG Emissions Reduction Measures

No.	Legislative Reduction	Description	Sectors Affected
1	SB 100 (Renewables Portfolio Standard)	Requires California energy utilities to procure 60 percent of electricity from renewable sources by 2030 and 100 percent carbon-free electricity by 2045.	Building Energy, Imported Water
2	SB 1020 (Clean Energy, Jobs, and Affordability Act)	Requires that 100% renewable electricity is procured to serve all State agencies by December 31, 2035 (this affects imported water received from the Department of Water Resources).	Imported Water
3	SB 1206 (Stationary Hydrofluorocarbon Reduction Measures)	Sets increasingly stringent prohibitions on the GWP content of bulk HFCs. In 2025, sales of HFCs with GWP over 2,200 are prohibited; in 2033, sales of HFCs with GWP over 750 are prohibited. Additionally, by January 1, 2025, CARB must post an assessment on its website specifying how to transition the state's economy, by sector, away from HFCs and to ultra-low or no GWP alternatives no later than 2035.	High-GWP[1]
4	SB 1383 (Short-Lived Climate Pollutant Reduction Strategy)	Targets a 40 percent reduction in methane and a 40 percent reduction in hydrofluorocarbons (e.g., high-GWP refrigerants) compared to 2013 levels by 2030. Includes specific targets for reducing organic waste in landfills.	Solid Waste, Wastewater, High-GWP[1]
5	Advanced Clean Car Standards (ACC)	Establishes GHG emission reduction standards for model years 2017-2025 that are more stringent than federal CAFE standards.	On-Road Fleet, Employee Commute, Business Travel, Construction Emissions
6	Advanced Clean Cars II (ACCII)	Assumes that 100 percent of new light-duty vehicle sales will be either ZEV or PHEV by model year 2035. Requirements will ramp up from a 35 percent requirement for the 2026 model year.	On-Road Fleet, Employee Commute, Business Travel, Construction Emissions
7	Advanced Clean Fleet (ACF)	Establishes zero-emissions targets for heavy-duty vehicles (such as utility trucks with a gross vehicle weight of over 8,500 pounds, dump trucks, and haulers) in California state- and local government- fleets.	On-Road Fleet, Construction Emissions

Notes: CAFE = Corporate Average Fuel Economy; CARB = California Air Resources Board; CEC = California Energy Commission; EPA = U.S. Environmental Protection Agency; GHG = greenhouse gas; HFC = hydrofluorocarbons; SB = Senate Bill; ZEV = zero emission vehicle; PHEV = plug-in hybrid electric vehicle; GWP = global warming potential.

1 The effects of SB 1383 do not impact Valley Water's future emissions because Santa Clara County is already implementing separate organic waste collection. Also, the State's Refrigerant Management Program, which supports the reduction of high GWP gases, is mainly focused on record keeping and mitigating leaks. The effects of SB 1206 are accounted for in the GHG reduction measures.

Source: Compiled by Ascent in 2024.

6.2 FORECAST RESULTS

Table 4 shows the BAU and legislative-adjusted forecasts for 2030 and 2045 by emissions scope and sector. Figure 5 visually summarizes the same data to illustrate the trends over time. In the legislative-adjusted forecast, Valley Water's GHG emissions are expected to decline by 18 percent to 12,656 $MTCO_2e$ by 2030 and by 48 percent to 8,071 $MTCO_2e$ by 2045 relative to baseline values. These legislative-adjusted values are the starting point for the reduction measures described in this plan. A detailed description of the methods and assumptions used for the forecast can be found in Appendix D.

Table 4 BAU and Legislative-Adjusted Emissions Forecasts and Targets by Sector ($MTCO_2e$/year)[1]

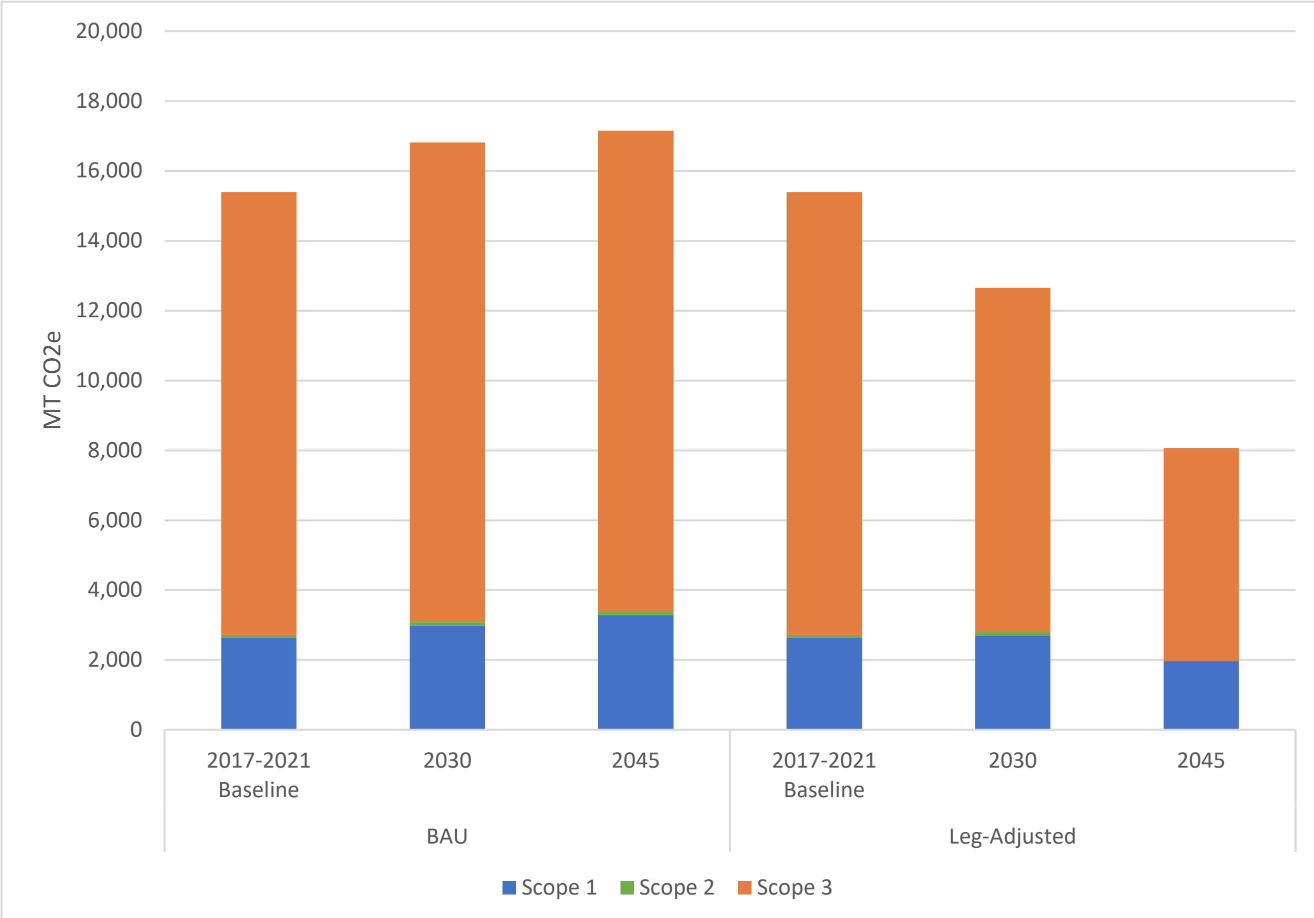
Scope	Sector	Baseline Emissions	BAU Emissions		Legislative-Adjusted Emissions	
		2017-2021	2030	2045	2030	2045
1	On-Road Fleet	1,102	1,212	1,378	933	58
	Natural Gas Use in Buildings	745	745	745	745	745
	Off-Road Fleet	703	952	1,082	952	1,082
	High GWP Gases	79	79	79	79	79
	Scope 1 Subtotal	2,630 (17%)	2,989 (18%)	3,284 (19%)	2,710 (21%)	1,965 (24%)
2	Facility Energy	84	95	95	93	0
	Scope 2 Subtotal	84 (<1%)	95 (1%)	95 (1%)	93 (1%)	0 (0%)
3	Construction	6,990	8,115	8,115	7,408	5,629
	Imported Water	4,022	4,174	4,222	1,372	0
	Employee Commute	1,219	981	981	651	129
	Solid Waste	236	236	236	236	236
	Business Travel	147	147	147	131	104
	Sediment Hauling	62	62	62	48	0
	Wastewater	9	9	9	9	9
	Scope 3 Subtotal	12,686 (82%)	13,724 (82%)	13,772 (80%)	9,854 (78%)	6,107 (76%)
Total		15,399	16,808	17,151	12,656	8,071
Percent Change from Baseline Levels		NA	9%	11%	-18%	-48%

Notes: BAU = Business-As-Usual; $MTCO_2e$ = metric tons of carbon dioxide equivalent, GWP = global warming potential, GHG = greenhouse gas, NA = not applicable. Percents shown as percent of total annual emissions.

1 Global warming potentials from the Intergovernmental Panel on Climate Change's Sixth Assessment Report were used in emissions inventorying.

Source: Prepared by Ascent in 2025.

Emissions reductions are primarily due to the State's progression toward a carbon-neutral electricity grid and cleaner vehicles, as detailed in Table 3 (Legislative Reductions). Reduced emissions from the electricity grid and vehicles result in less emissions from Valley Water's on-road fleet, facility energy, construction, imported water, employee commute, business travel, and sediment hauling. Based on existing data, activity and emissions from other sectors, such as facility natural gas and high-GWP gas use and solid waste and wastewater production, are anticipated to remain unchanged in the forecast. The emissions forecasts and comparisons to 2017-2021 baseline emissions are shown in Table 4 and Figure 6.

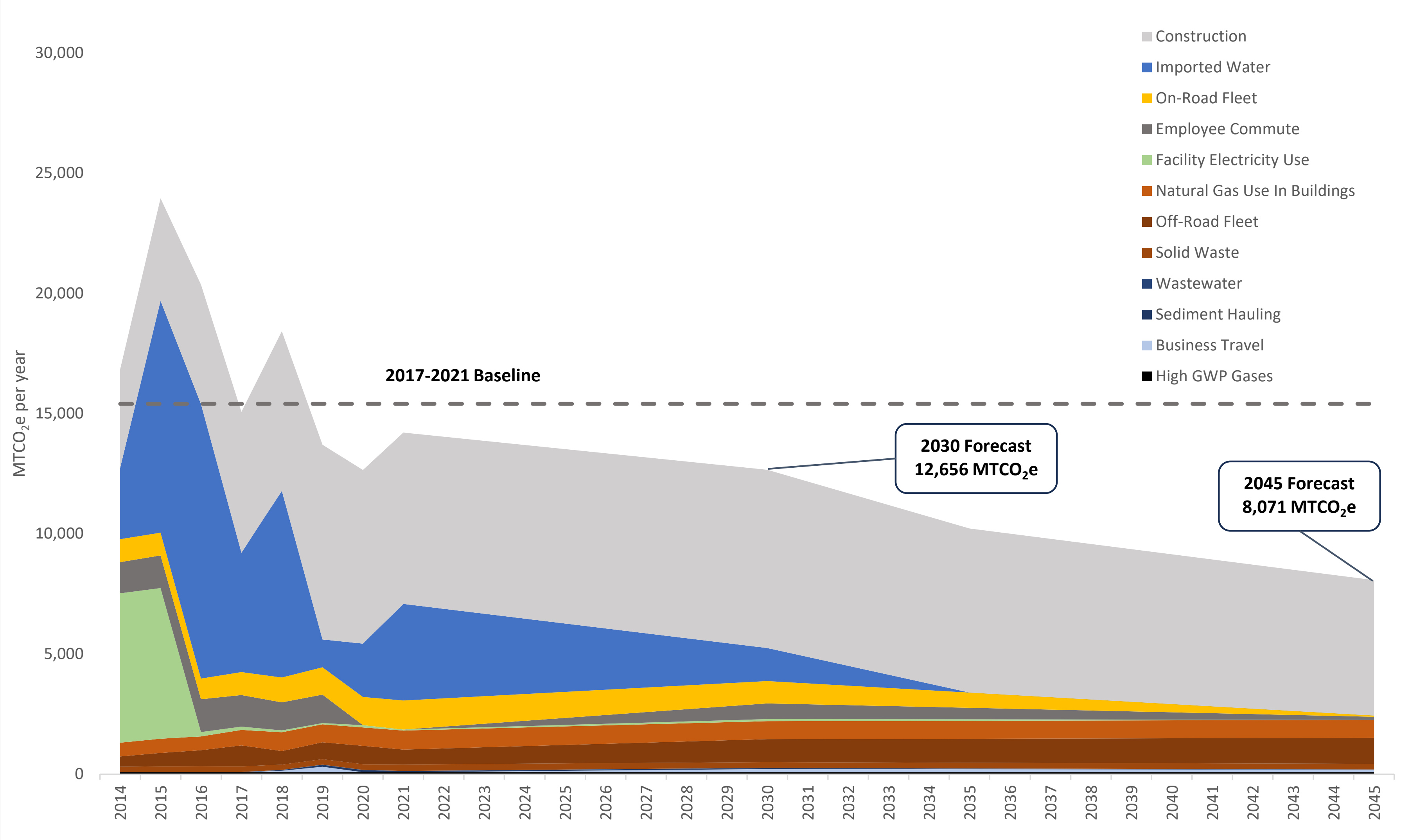


Note: Valley Water's Scope 2 emissions are included in this graph but are less than 100 $MTCO_2e$/year.

Source: Prepared by Ascent in 2025.

Figure 5 Business-As-Usual and Legislative-Adjusted Forecast Emissions Forecasts (MTCO2e/year)

With the implementation of legislative reductions from SB 1020 and SB 100, electricity used by the SWP becomes cleaner, and the associated emissions from imported water are expected to be reduced. As a result, construction-related emissions are anticipated to dominate Valley Water's future emissions profile. By 2045, construction emissions are predicted to account for 70 percent of Valley Water's total emissions—up from 45 percent in the baseline. Emissions from future projects with CEQA mitigation measures requiring net-zero construction emissions, including the Anderson Dam Seismic Retrofit Project, are not included in the GHGRP construction emissions forecast. Although construction emissions will make up a larger share of the emissions portfolio, absolute construction emissions are forecasted to decrease over time from the baseline of 6,990 $MTCO_2e$/year to 5,629 $MTCO_2e$/year by 2045. Additional discussion of the emission forecast data, calculation methodology, and results can be found in Appendices A and D.



Source: Prepared by Ascent in 2025.

Figure 6 Legislative-Adjusted Emissions Forecasts by Sector ($MTCO_2e$/year)

7 TARGET SETTING

Establishing a GHG emissions reduction goal, commonly referred to as a "GHG reduction target," is a key step in the local GHG reduction planning process. Valley Water's updated GHG emissions inventory and forecast provide a basis for target setting by understanding the additional actions needed to meet emissions targets. They also provide a benchmark against which future GHG reductions can be tracked. In CEQA-qualified GHGRPs, local GHG reduction targets are developed in a manner consistent with statewide GHG emissions targets established under State law.

7.1 STATE GHG REDUCTION TARGETS

The State's current GHG reduction targets were established by SB 32 and AB 1279 and incorporated into the 2022 Scoping Plan. They include the following:

- Reduce statewide anthropogenic GHG emissions to 40 percent below 1990 levels by 2030 (SB 32);
- Reduce statewide anthropogenic GHG emissions to 85 percent below 1990 levels by 2045 (AB 1279); and
- Achieve statewide net zero GHG emissions (i.e., "carbon neutrality") no later than 2045 and achieve and maintain net negative GHG emissions after that (AB 1279).

AB 1279 defines net zero GHG emissions as balancing remaining GHG emissions by 2045 with removals of GHG emissions over the same time.

7.2 VALLEY WATER GHG REDUCTION TARGETS

The 2022 Scoping Plan sets individual targets for each emissions sector that, when combined, meet statewide emission reduction targets. To scale these state-level targets to Valley Water, it is important to first understand Valley Water's level of control over the emissions sources included in the Scoping Plan. Valley Water has direct or indirect control over emissions from six of the seven anthropogenic emissions sectors included in the Scoping Plan's statewide inventory: residential and commercial, electric power, high-GWP gases, industrial, recycling and waste, and transportation. Valley Water has no control over agricultural emissions. Thus, the Scoping Plan targets for non-agricultural emissions sectors are applicable to Valley Water.

The state inventories its emissions annually and between 2017 and 2021, the state's emissions were approximately 5 percent lower than they were in 1990 (CARB 2007, CARB 2024b). Thus, adjusting the state GHG reduction targets relative to Valley Water's baseline years (average 2017 and 2021) and removing targets associated with agricultural emissions, Valley Water's emissions would need to be reduced by 86 percent below baseline by 2045 (43 percent by 2030) to be consistent with the reduction target established by AB 1279. While these targets are focused on reducing anthropogenic emissions, AB 1279 also sets a carbon neutrality goal for 2045 that includes reductions from the removal of carbon dioxide (CO_2) from the air, including carbon sequestration and mechanical carbon capture, utilization, and storage (CCUS). Though Valley Water does not have CCUS activities, it does manage thousands of acres of natural lands, such as streams, riparian areas, and marshes, where there are notable carbon sequestration opportunities. Therefore, to demonstrate consistency with state targets and considering relevant emissions sectors, Valley Water should, at minimum:

- reduce Valley Water's anthropogenic GHG emissions by 86 percent below 2017-2021 baseline levels by 2045,
- achieve carbon neutrality no later than 2045 through enhanced carbon sequestration, and
- in the near term, plan to reduce Valley Water's anthropogenic GHG emissions by 43 percent below 2017-2021 baseline levels by 2030.

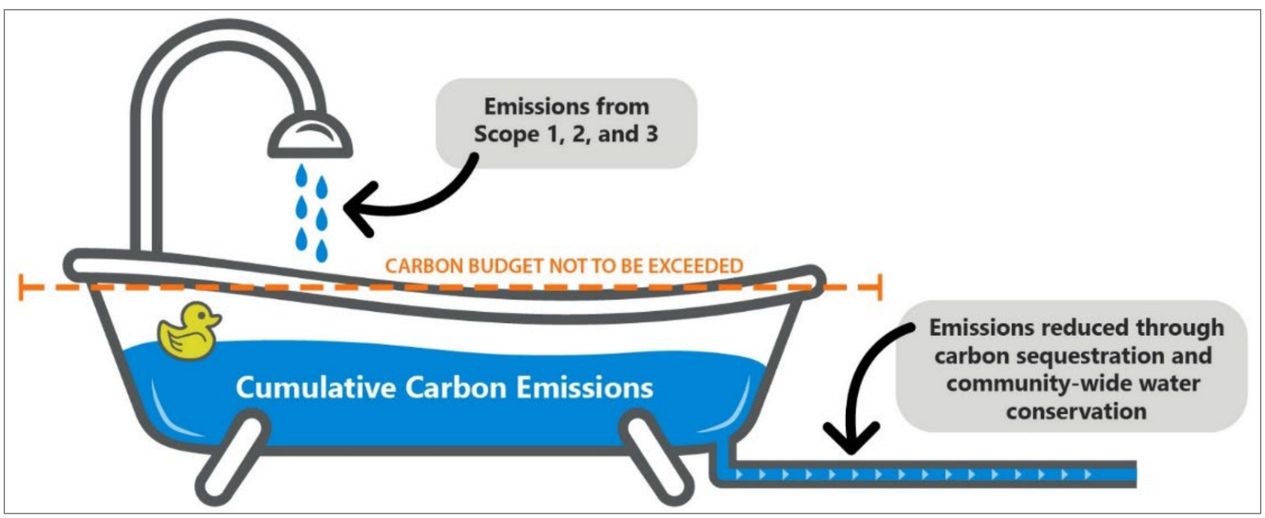
These reduction targets align with the state's goal of carbon neutrality by 2045, as outlined in the 2022 Scoping Plan and AB 1279. While the 2030 target serves as an interim benchmark, the unique and variable nature of water district operations—driven by fluctuating climate and resource needs—makes achieving exact annual reductions challenging. As such, the GHGRP's 2030 analyses are provided for informational and benchmarking purposes. Rather than focusing on specific yearly targets, Valley Water commits to a cumulative reduction approach. By managing emissions from 2025 to 2045, total emissions should stay within a defined carbon budget (described further below), that are cumulatively consistent with both 2030 and 2045 statewide objectives. This carbon budget strategy ensures Valley Water's path to carbon neutrality remains on track, despite variability in emissions year-to-year.

7.3 THE CARBON BUDGET CONCEPT

Traditionally, CAPs prepared by cities and counties set a GHG reduction target by which a community or agency's operations should reduce their annual emissions in a particular future year. These targets are based on communitywide emissions that are generally consistent year-to-year, except under extreme socioeconomic or environmental circumstances. However, Valley Water's GHG emissions often vary year to year, due primarily to the demand for imported water) and the need to perform construction projects.

With this variable emissions trend, a traditional approach to targeting a percent reduction in annual emissions from a past baseline year could result in the unintended consequence of exceeding a particular year's GHG reduction target. To address this issue, the GHGRP uses a carbon budget approach similar to that adopted by MWD in their CAP (MWD 2022).

Figure 7 illustrates a bathtub as an analogy to explain the carbon budget approach. A bathtub has an inflow, a holding capacity, and an outflow. The water collected in the bathtub represents emissions. The inflow represents Scopes 1-3 emissions generated by Valley Water, and the outflow represents emissions reduction from carbon sequestration and community-wide water conservation that Valley Water is responsible for. The capacity of the bathtub represents the total carbon budget. When the inflow increases and the outflow decreases, water begins to accumulate in the bathtub (i.e., cumulative emissions).To stay within budget (i.e., keep the tub from overflowing), the inflow can either decrease through the reduction of operational and construction emissions implemented through the GHGRP measures, or the outflow can increase through the implementation of increased community-wide water conservation and local carbon sequestration. Any imbalance of these flows, over time, can result in the tub becoming overfilled, representing an exceedance of the carbon budget. Managing the rate of inflows and the accumulation in the bathtub is essential to remain within the budget and achieve Valley Water's carbon neutrality goals by 2045. Appendix H shows an example calculation of the carbon budget concept and how new projects can show consistency with the carbon budget.

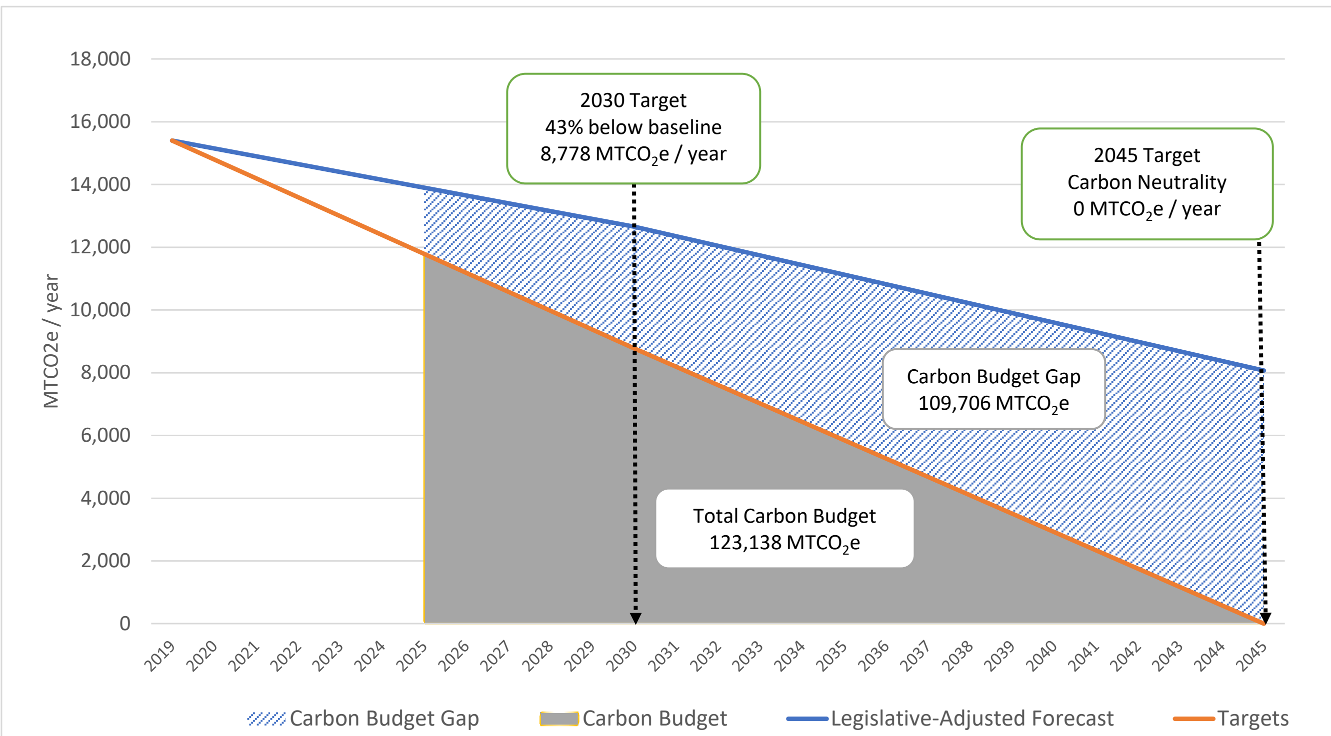


Source: Prepared by Ascent in 2024.

Figure 7 Carbon Budget Illustration

Consistent with SB 32 and AB 1279, statewide targets under the 2022 Scoping Plan, and guidance from the Bay Area Air District, Valley Water is targeting a 43 percent reduction in annual emissions from its 2017-2021 baseline by 2030 and net zero emissions by 2045. These targets were then translated into the carbon budget for 2030 to 2045. The carbon budget limits cumulative GHGs emitted over a set time frame. This limit is equivalent to the sum of annual GHG emissions that, across a set number of years, follow a linear trajectory toward achieving the emissions reduction targets (see Figure 7). Based on the 2045 net-zero emissions target, Valley Water's total carbon budget is 123,138 $MTCO_2e$ for the GHGs emitted between 2025 and 2045. To be consistent with this target, Valley Water's total emissions from 2025 to 2045 must be less than or equal to this amount to remain within the budget. 2025 is likely when implementation of this GHGRP will begin, and as such, was chosen as the year in which emissions accounting under the carbon budget would begin.

Figure 8 below shows this concept graphically for Valley Water's context. The gray-shaded area represents the carbon budget, and the blue gap between the legislative-adjusted forecast and the targets line represents additional reductions that must be achieved by the measures described in Chapter 8. The orange line shows the annual emissions that form the carbon budget follow a linear trajectory from the baseline level to zero by 2045. The baseline shown in Figure 8 is the average annual emissions between 2017-2021, assigned to the year 2019, which is the median year between 2017 and 2021.



Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Prepared by Ascent in 2025.

Figure 8 Legislative-Adjusted Forecast, Targets, and Carbon Budget, 2025-2045

7.3.1 Emissions Reduction Target Alignment with CEQA

These targets, as aligned with SB 32 and AB 1279, provide the basis for the GHGRP's use as a qualified plan adopted to reduce emissions of GHGs. CEQA Guidelines Section 15064.4(a) states that lead agencies "shall make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate" GHG emissions resulting from a project. The CEQA Guidelines note that an agency has the discretion to either quantify a project's GHG emissions or rely on a "qualitative analysis or performance-based standards" (Section 15064.4[a]). A lead agency may use a "model or methodology" to estimate GHG emissions and has the discretion to select the model or methodology it considers "most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change" (Section 15064.4[c]). The CEQA Guidelines provide that the lead agency should consider the following when determining cumulatively considerable impacts from GHG emissions on the environment (Section 15064.4[b]):

1. *The extent a project may increase or reduce GHG emissions as compared to the existing environmental setting.*
2. *Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.*
3. *The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.*

As proposed, the GHGRP and its targets satisfy these criteria by providing a framework for future projects' contribution of GHG emissions above baseline conditions and serve as a threshold that is inherently tied to the State's long-term GHG reduction targets using Valley Water's local, independent inventory.

After adopting the GHGRP, future Valley Water projects may tier from the GHGRP under CEQA, and this GHGRP establishes a pathway to ensure Valley Water's operations do not result in a cumulatively considerable level of emissions by committing to net zero emissions by 2045. This level of commitment is consistent with AB 1279, the guidance outlined in the CARB's 2022 Climate Change Scoping Plan (Scoping Plan), and the Bay Area Air District's 2022 CEQA Guidelines. Under the latest Scoping Plan, the State also aims to achieve carbon neutrality by 2045 but does so with carbon dioxide removal (CDR) technologies and sequestration to achieve carbon neutrality (CARB 2022a). Valley Water has a significant role in local conservation, restoration, and enhancement of riparian lands, wetlands, and other aquatic habitat types, which could help offset Valley Water's anthropogenic GHG emissions. The role of carbon sequestration in Valley Water's GHG reduction targets is discussed in Chapter 8.

8 GREENHOUSE GAS REDUCTION MEASURES

Identifying and implementing GHG reduction measures to reduce Valley Water's emissions is essential to achieving carbon neutrality objectives. Reaching carbon neutrality will require unprecedented levels of investment in zero-emission on-road and off-road vehicles, building decarbonization, waste reduction, and a commitment to conserving and enhancing natural lands, thereby increasing carbon sequestration. As was previously mentioned and discussed further below, Valley Water's jurisdiction is limited, especially for Scope 3 emissions. Valley Water cannot unilaterally mandate that its contractors or employees perform specific actions to reduce GHG emissions. Furthermore, Valley Water has an obligation to its ratepayers to provide safe, clean water at an affordable rate, and thus must balance the implications of additional costs and the resulting rate effects. Despite these challenges, Valley Water is committing to reach net zero emissions for Scopes 1, 2, and, as feasible, Scope 3 by 2045.

This chapter proposes 11 measures to reduce emissions from Scopes 1 and 3 and to provide additional reductions through water conservation and carbon sequestration. It establishes a pathway to carbon neutrality consistent with AB 1279 and CEQA Guidelines Section 15183.5(b)(1)(D).

Table 5 summarizes the list of GHGRP measures, presented by scope, and the anticipated reductions resulting from implementing each measure. The GHG reduction values are shown as cumulative reductions for two periods: 2025 through 2030 and 2025 through 2045. The cumulative reductions by 2030 and 2045 are compared against the cumulative emissions under the legislative adjusted forecast and the allowed carbon budget by those years. If successfully implemented, the proposed measures would achieve a 38 percent reduction in annual emissions below the baseline by 2030 and carbon neutrality by 2045 with support from carbon sequestration-related actions. As construction emissions are forecasted to comprise the majority of Valley Water's emissions in 2045, much of the proposed measure reductions are focused on construction activities. Note that no Scope 2 measures were proposed because electricity, the only emissions source under that scope, does not currently and will not generate GHG emissions in the future under Valley Water's subscription to PWRPA's Zero Carbon Water portfolio.

A detailed discussion of each measure is included under "8.1 Measure Details."

Table 5 Cumulative GHG Reductions from Measures in 2030 and 2045 ($MTCO_2e$)

Sector	Measure Number	Measure Name	Measure Description	2025-2030 Cumulative Reduction[a]	2025-2045 Cumulative Reduction
Scopes 1					
Fleet	VF-1	Zero Emission On-Road Fleet	Convert 35% of Valley Water's on-road fleet fuel use to zero-emission fuels (e.g., electricity, renewable diesel) by 2030, and 100% by 2045.	434	1,912
Fleet	OF-1	Zero Emission Off-Road Fleet	Require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional diesel in 95% of Valley Water's off-road fleet by 2030, and 100% by 2045.	2,713	17,700
High GWP Gases	HG-1	Phase Out High-GWP refrigerants	Replace high-GWP refrigerants with low-GWP alternatives above and beyond the requirements of SB 1206.	122	734
Facility Energy	FE-1	Facility Electrification	Electrify 30% of existing facility natural gas use by 2030, and 76% by 2045.	671	6,769
			Total Scope 1 Reductions	3,941	27,115
Scope 3					
Employee Commute	EC-1	Reduce Employee Commute Emissions	Implement incentives to encourage employees to reduce their VMT or reduce emissions from their commute vehicle.	39	171
Solid Waste	SW-1	Increase Solid Waste Diversion	Divert 80% of waste from Valley Water offices from landfills by 2030, and 90% by 2045. Improve solid waste tracking by conducting regular assessments of waste characterization.	472	3,147
Construction	CN-1	Zero Emission Off-Road Construction Equipment	For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional diesel in 17% of off-road construction equipment fuel use in equipment greater than 25 hp by 2030, and 70% by 2045 regardless of the engine Tier.	2,818	40,201
Construction	CN-2	Zero Emission On-Road Construction Vehicles	For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional fuel in 35% of on-road construction vehicle fuel use by 2030, and 100% by 2045.	446	1,805
Water Conservation	WA-1	Increase Water Conservation	Increase communitywide water conservation to 98,800 acre-feet per year by 2030 and 118,000 acre-feet per year by 2045.	1,409	4,164
Carbon Sequestration	CS-1	Sequester Carbon	Sequester carbon in habitat enhancement and restoration projects. Collaborate with regional conservation agencies to identify projects that are beyond project mitigation. (Non-anthropogenic source)	179	60,063
Offsets	CS-2	Purchase Carbon Offsets	Purchase carbon offsets from verified offset registries, prioritizing local or regional projects and, if necessary, projects outside of the state, but within the United States. Prohibit carbon offset purchases that are unverified or located outside the United States. (Non-anthropogenic source)	Not Quantified	Not Quantified
			Total Scope 3 Reductions	5,363	109,552
Total Cumulative Reductions (all scopes)				9,304	136,666
Forecasted[b] Cumulative Emissions (without reductions)				79,678	232,844
Forecasted[b] Cumulative emissions (with reductions)				70,374	96,178
Allowed Carbon Budget				61,695	123,138
Remaining Emissions Gap after Reductions[c]				8,679	-26,961

Notes: VMT = Vehicle Miles Traveled, $MTCO_2e$ = metric tons of carbon dioxide equivalent, GHG = greenhouse gas emissions, BMP = best management practices.

[a] 2030 emissions reductions, forecasts, and carbon budgets provided for informational and benchmark purposes only.

[b] Legislative-adjusted forecast

[c] Indicates cumulative-emissions needed to meet the carbon budget for a given time period (e.g., 2025 to 2030 or 2025 to 2045). Negative value indicates that the carbon budget is met and there is a surplus of emissions reductions.

Source: Modeled by Ascent in 2025.

As shown in Table 5, the proposed measures would result in an excess emission reduction over the 20-year period between 2025 and 2045. There would be 26,961 $MTCO_2e$ remaining in the carbon budget in 2045, accounting for cumulative emissions after measure implementation. Most reductions are attributed to the significant wetland restoration work planned by Valley Water under CS-1, which represents just over half of the estimated reductions across all measures. This is followed by significant reductions from the use of zero emission fuels in off-road construction equipment under CN-1. With respect to the anthropogenic target, the reductions from all measures except for CS-1 and CS-2 are estimated to result in annual emissions that are 86 percent below baseline levels by 2045, meeting the target identified under AB 1279 (See Section 7.2). The estimated reductions are based on an extensive internal feasibility assessment of each measure and reduction opportunities from each emissions source. To ensure that these targets are achieved, the GHGRP also includes an implementation monitoring plan, which will provide oversight and facilitate adaptive management throughout the process.

The discussion below presents the details of each measure. For each measure, a short measure summary is provided, followed by the context of the measure in terms of Valley Water operations, substantiation of specific measure targets, if any, the calculation assumptions, and the resulting estimated cumulative reductions. Additionally, the discussion recommends specific implementation actions and are categorized as either “quantified” or “supportive.” These actions are described as “quantified” if they were directly used in the calculation of a measure’s GHG reduction potential. “Supportive” actions were not quantified but are essential to support the successful implementation of the measure (e.g., annual reporting and updating purchasing policies).

8.1 SCOPE 1 REDUCTION MEASURES

VF-1: Zero Emission On-Road Fleet

Convert 35% of on-road fleet fuel use to zero-emission fuels (e.g., electricity, renewable diesel) by 2030, and 100% by 2045.

Under current practices, Valley Water-owned on-road vehicles (including passenger cars, pickup trucks, and heavy-duty trucks) are replaced at the end of their life (generally around 100,000 miles or 10 years) with hybrid or zero-emission vehicles (ZEVs). Under ACCII, an increasing number of new light-duty vehicle sales are required to be zero-emission vehicles, and under ACF, an increasing percentage of local government agencies' heavy-duty fleets must be ZEVs. As these regulations are implemented, 23 percent of Valley Water's on-road vehicles are projected to be ZEVs by 2030 and 96 percent by 2045—see Section 2.3 of Appendix D for more details on how ACCII and ACF were used to derive these projections. VF-1 proposes that Valley Water exceed these projections to achieve a 35 percent ZEV fleet by 2030 and a 100 percent ZEV fleet by 2045 across all on-road vehicle types.

2030 Target	2045 Target
35% of Valley Water's on-road fleet uses zero-emission fuels.	100% of Valley Water's on-road fleet uses zero-emission fuels.
Install 20 electric vehicle charging stations	Install 35 electric vehicle charging stations
Cumulative Reduction Potential by 2030: 434 $MTCO_2e$	Cumulative Reduction Potential by 2045: 1,912 $MTCO_2e$

- Quantified Action VF-1.1: Require an expansion of ZEV procurement during vehicle replacement or fleet growth, where available and financially feasible, such that 35 percent of Valley Water's on-road fleet fuel use comes from zero-emission fuels by 2030 and 100 percent by 2045.
- Supportive Action VF-1.2: Install at least 20 additional electric vehicle charging stations, Level 2 or faster, by 2030 and 35 by 2045. Valley Water currently has 12 operational EV stations with 18 charging ports and already has a plan outside of the GHGRP to install 20 stations (with 40 charging ports) by the end of 2026.
- Supportive Action VF-1.3: Establish a formal "ZEV/EV first policy" to prioritize the purchase of ZEVs and EVs when acquiring new fleet vehicles, while also considering cost, technological feasibility, and operational needs.

<u>Calculation Assumptions</u>

For calculation purposes, Valley Water's on-road fleet was assumed to be all gasoline vehicles, with a weighted average emissions factor of approximately 622 grams carbon dioxide equivalent (CO_2e) per vehicle mile traveled (VMT). On-road diesel use is captured in the calculation under OF-1. ACF and ACCII are expected to increase the penetration of zero-emission vehicles in the fleet, so this emissions factor is expected to drop to 478 grams CO_2e per VMT in 2030 and 26 grams CO_2e per VMT in 2045. This implies that, under ACF and ACCII, 77 percent of the fuel used in Valley Water's on-road fleet would be from fossil fuel use in 2030, and 4 percent in 2045. Under Measure VF-1, those percentages would further decrease to 65 percent in 2030 and 0 percent in 2045. These rates are applied to forecast future fleet growth based on historical fuel use trends in Valley Water's fleet.

OF-1: Zero Emission Off-Road Fleet

Convert 95% of Valley Water's off-road fleet conventional diesel use to zero-emission fuels in 2030 and 100% by 2045, regardless of engine tier.

Off-road vehicles and equipment, such as excavators and bulldozers, are typically fueled by diesel. However, zero-emission technologies exist, such as electric backhoes. Additionally, renewable diesel is readily available, with 24 stations already operating in Santa Clara County, according to the US Department of Energy (DOE 2023). Renewable diesel is sourced solely from renewable sources, similar to B100 biodiesel, but is chemically identical to conventional diesel and can be used in its place without the need for new equipment or modifications. The combustion of renewable diesel is biogenic, resulting in net zero emissions by returning the carbon sequestered from biological activities back into the atmosphere. Thus, for the purposes of this GHGRP, the combustion of renewable diesel and biodiesel is counted as having no CO_2 emissions, though both fuels still emit methane (CH_4) and nitrous oxide (N_2O). This is consistent with CARB's GHG reduction strategies and the state's GHG inventories, which do not count biogenic CO_2 towards the total GHG emissions allowed by AB 32 (CARB 2022b: 12-13). Additionally, it is consistent with the US Community Protocol from Local Governments for Sustainability (also known as the International Council for Local Environmental Initiatives, or ICLEI), which states that biogenic carbon emissions are part of the short-term carbon cycle and, thus, should not be added to any inventory total (Local Governments for Sustainability 2013: 5).

OF-1 proposes that Valley Water uses either zero-emission off-road fleet equipment or zero-emission fuels (e.g., renewable diesel) to replace 95 percent of conventional fuel use in its off-road fleet by 2030 and 100 percent by 2045. As of 2024, 100 percent of diesel dispensed at Valley Water's headquarters fueling station is renewable diesel. While zero-carbon emissions fuels, such as renewable diesel, are sufficient in achieving the climate goals of the GHGRP, true zero-emissions vehicles emit neither direct GHG emissions (including CH_4 and N_2O) nor direct criteria air pollutant emissions. As such, under OF-1, Valley Water would maintain existing renewable diesel usage and expand the use of other zero-emissions fuels, such as electric alternatives, where feasible. In cases where new zero-emission off-road technology is unavailable or financially infeasible, this measure is designed to be flexible to enable Valley Water to determine how it can achieve zero emissions from its off-road fleet. Additional discussion about the current and future availability of renewable diesel and the accounting of biogenic emissions from renewable diesel can be found in Appendix C.

2030 Target	2045 Target
95% of Valley Water's off-road fleet fuel use is from zero-emission fuels.	100% of Valley Water's off-road fleet fuel use is from zero-emission fuels.
Cumulative Reduction Potential by 2030:	**Cumulative Reduction Potential by 2045:**
2,713 $MTCO_2e$	**17,700 $MTCO_2e$**

- **Quantified Action OF-1.1:** Require the use of zero-emission fuels or purchase and use of zero-emission equipment during vehicle replacement or fleet growth, such that 95 percent of Valley Water's off-road fleet fuel use comes from zero-emission fuels by 2030 and 100 percent by 2045.

<u>Calculation Assumptions</u>

In the legislative-adjusted scenario, emissions in this sector are expected to increase over time due to increased conventional diesel fuel usage (10 percent over the 2017 – 2021 maximum for 2030, and 25 percent over the 2017 - 2021 maximum for 2045; [Young, pers. comm., 2023]). Implementation of this measure would result in a reduction of these emissions by 95 percent and 100 percent in each of those years. This reduction is driven, in part, by the CARB Off-Road Regulation. This regulation requires that beginning January 1, 2024, all California fleets procure and use R99 or R100 renewable diesel fuel in vehicles subject to the regulation, with limited exceptions (such as vehicles in captive attainment areas, fleets that already have Tier 4 off-road engines, or vehicles operating in cold weather) (CARB 2023a). The rest of the reduction is assumed to be due to the use of other zero-emission fuels, such as electricity and renewable diesel (the use of which goes above and beyond the Off-Road Regulation). For calculation purposes, this measure applies to the off-road fleet, and diesel on-road fleet, operated by Valley Water and does not pertain to off-road equipment used by Valley Water contractors, which is addressed by Measure CN-1.

HG-1: Phase Out High-GWP Refrigerants

Replace high-GWP refrigerants with low-GWP alternatives above and beyond the requirements of SB 1206.

High-GWP gases account for less than 1 percent of Valley Water's total emissions, but as a Scope 1 source, Valley Water has direct control over these emissions. Refrigerant leakage and resulting fugitive emissions are the primary sources of emissions of high-GWP gases from the Valley Water facility and vehicle cooling demands. High-GWP gases have the potential to warm the earth's atmosphere hundreds to thousands of times more than CO_2. For example, a common refrigerant used in Valley Water facilities and vehicles is R-134a, which is 1,430 times more insulative than CO_2 in the atmosphere. Under SB 1206, CARB requires all refrigerants sold to have less than 750 GWP by 2035. Some examples of ultra-low GWP refrigerants that have less than 750 GWP include R-454B, R-123, and R-30 – a list is available on CARB's website (CARB 2024c). Under HG-1, Valley Water would exceed State requirements by meeting this requirement five years earlier.

2030 Target	2045 Target
100% of refrigerants purchased must be rated as low-GWP, having less than 750 GWP	100% of refrigerants purchased must be rated as low-GWP, having less than 750 GWP
Cumulative Reduction Potential by 2030:	Cumulative Reduction Potential by 2045:
122 $MTCO_2e$	734 $MTCO_2e$

- **Quantified Action HG-1.1:** Adopt an internal policy to require that all purchases of refrigerants be for low-GWP refrigerants by 2030.

<u>Calculation Assumptions</u>

Valley Water's refrigerants currently have a weighted average current GWP of 1,542. SB 1206 prohibits the sale of HFCs with a GWP greater than 750, starting in January 2033 (CARB 2023b). Valley Water plans to accelerate compliance with this requirement, achieving it by January 2030. Thus, compliance with this requirement would reduce Valley Water's refrigerants' weighted average GWP by approximately 51 percent.

FE-1: Facility Electrification

Electrify 30% of existing facility natural gas use by 2030, and 76% by 2045.

Natural gas consumption in buildings and facilities accounts for four percent of GHG emissions generated by Valley Water operations and 52 percent of emissions from facility operations. Decarbonizing existing buildings by replacing gas appliances with electric alternatives is critical to reducing GHG emissions from facilities. Electric alternatives to space and water heating, such as heat pumps, are already available. Under FE-1, Valley Water would gradually transition Valley Water's facilities to all-electric, targeting electrification of 30 percent of existing natural gas use by 2030 and 76 percent by 2045. Valley Water does not anticipate new buildings to be built through 2045.

2030 Target	2045 Target
30% of natural gas use is replaced with electricity.	76% of natural gas use is replaced with electricity.
Cumulative Reduction Potential by 2030:	Cumulative Reduction Potential by 2045:
671 $MTCO_2e$	6,769 $MTCO_2e$

- Supportive Action FE-1.1: At the end of their usable life, replace natural gas appliances and HVAC systems with electric alternatives.
- Supportive Action FE-1.2: Perform an internal review of all facilities and identify opportunities for electrification, prioritizing the replacement of older equipment first. For more challenging transitions, such as for large-scale building heating systems, conduct a formal study with a commercial or industrial energy consultant to identify feasible electrification solutions, as necessary.

<u>Calculation Assumptions</u>

Valley Water currently uses natural gas stoves and HVAC equipment in some of its buildings and is targeting the replacement of 30 percent of natural gas use by 2030 and 76 percent by 2045. The 2045 target exceeds a similar target from a study estimating that 65 percent of existing commercial building stock in California could be retrofitted by 2050 (Mozingo 2021: xviii). This exceedance is needed to help Valley Water achieve its target of reducing anthropogenic emissions by 86 percent below baseline levels by 2045. It is assumed that the electricity used as the heat source in these buildings is procured from PWRPA's zero-carbon portfolio; thus, there would be no additional emissions from electricity.

8.2 SCOPE 3 REDUCTION MEASURES

EC-1: Reduce Employee Commute Emissions

Implement incentives to encourage employees to reduce their VMT or reduce emissions from their commute vehicle.

Emissions from employee commute trips make up seven percent of Valley Water's emissions, but these emissions are anticipated to decline in the future under ACCII. Although Valley Water does not have direct control over the commute choices of its employees, it can influence them by offering incentives to reduce VMT. Valley Water currently offers preferential parking for carpools, EV charging, and bicycle amenities such as secured bike parking. Other approaches Valley Water could explore include providing subsidized or free transit passes, a bike tool library, bike-to-work events, and subsidies for bicycle-related expenses. However, the California Air Pollution Control Officer Association recognizes that these types of voluntary measures have limited effectiveness (CAPCOA 2021: 83-84). Valley Water does not anticipate a net increase in the number of employees through 2045.

2030 Target	2045 Target
Implement at least 50% of the commute emissions reduction programs listed under EC-1.	Implement 100% of the commute emissions reduction programs listed under EC-1.
Cumulative Reduction Potential by 2030:	**Cumulative Reduction Potential by 2045:**
39 $MTCO_2e$	**171 $MTCO_2e$**

- **Supportive Action EC-1.1**: Evaluate the possibility of offering free or subsidized transit passes to all employees.
- **Supportive Action EC-1.2:** See Action VF-1.2.
- **Supportive Action EC-1.3:** Evaluate the status of existing bicycle facilities and amenities at Valley Water office buildings and identify areas of improvement. Install or improve bicycle facilities and amenities, if necessary, to:
  - Continue providing and ensuring that existing bicycle parking facilities are 1) secured either indoors, 2) secured in outdoor lockers, or 3) secured in outdoor racks with video monitoring.
  - Continue offering well-maintained on-site showers.
  - Make available a secured bicycle tool library and tire pumps at or near bicycle parking facilities to assist with any on-site maintenance needs.
- **Supportive Action EC-1.4:** Encourage cycling through holding bike-to-work events and prizes.
- **Supportive Action EC-1.5:** Expand preferential parking for carpools and ZEVs.
- **Supportive Action EC-1.6:** Develop a remote work protocol to provide employees the opportunity to execute work tasks at home or off site to reduce commute trips.

<u>Calculation Assumptions</u>

This measure assumes that in 2030 and 2045, 50 and 100 percent of the actions recommended in this measure would be implemented, respectively. These actions are assumed to directly apply to forecasted emissions from employee commutes. This program is assumed to reduce VMT by 4 percent (CAPCOA 2021: 83-84).

SW-1: Increase Solid Waste Diversion

Divert 80% of waste from Valley Water offices from landfills by 2030, and 90% by 2045. Improve solid waste tracking by conducting regular assessments of waste characterization.

Employee-generated solid waste accounts for 1 percent of Valley Water's emissions. Although Valley Water does not have direct control over the emissions generated from the decomposition of this generated waste, it can influence it by first having a better understanding of the characterization of the waste being generated (e.g., percent organics vs percent recyclable). Once the waste stream is better understood and with the knowledge that organic waste is the primary source of methane in landfills, Valley Water can take steps to reduce organics from being landfilled by encouraging increased usage of organics collection bins and utilizing the organics waste-collection services offered by Republic Services. Under SW-1, Valley Water would target an 80 percent diversion rate from landfills by 2030 and 90 percent by 2045.

2030 Target	2045 Target
80% of organics and recyclables must be diverted from landfills by 2030.	90% of organics and recyclables must be diverted from landfills by 2045.
Cumulative Reduction Potential by 2030:	Cumulative Reduction Potential by 2045:
472 $MTCO_2e$	3,147 $MTCO_2e$

- Supportive Action SW-1.1: Begin regular tracking of waste disposal at all Valley Water facilities to better understand the characterization of Valley Water's waste generation rates (e.g., pounds of recyclable waste per employee per year).
- Supportive Action SW-1.2: Conduct an annual waste characterization study that identifies the distribution of organics, recyclables, and non-recyclables among the generated waste.
- Supportive Action SW-1.3: Where not already implemented, provide and collect separate organics and recycling bins.
- Supportive Action SW-1.4: Provide educational materials and signage for existing and new organics and recycling bins to ensure the proper disposal of waste at Valley Water facilities.

Calculation Assumptions

Currently, 40 percent of waste is assumed to be diverted from landfills, and the remaining 60 percent is landfilled (CalRecycle 2023). This measure would increase diverted waste to 80 and 90 percent by 2030 and 2045, implying landfill rates of 20 percent and 10 percent by those years, respectively.

CN-1: Zero Emission Off-Road Construction Equipment

For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional diesel in 17% of off-road construction equipment fuel use in equipment greater than 25 hp by 2030, and 70% by 2045 regardless of the engine Tier.

As a provider of flood protection and safe, clean water, construction activities occur regularly as Valley Water continues to enhance and improve the water resources and ecosystems of Santa Clara County. These include both large- and medium-scale infrastructure improvements like the construction of flood walls, levees, dams, pipelines, and water treatment plants, as well as smaller flood protection activities, such as levee and stream maintenance, and restoration of native habitat. Using a combination of historical trends, plans from Valley Water's Five Year Capital Improvement Program, and known legislative reductions, Valley Water anticipates construction-related emissions to decline modestly in the future by about 20 percent from baseline conditions through 2045 (Valley Water 2023). However, without further reductions, it will still be the largest emissions sector in 2045, comprising 70 percent of the total emissions in that year. Thus, to achieve Valley Water's 2045 carbon neutrality target and reduce anthropogenic emissions by 86 percent below baseline levels by 2045, aggressive additional actions need to be taken to reduce emissions further.

Construction emissions come from off-road equipment and on-road vehicles (on-road vehicles include both construction-related transport vehicles, such as haul trucks, as well as the vehicles that construction workers use to commute to the job site). Currently, off-road emissions account for 67 percent of construction emissions, with the other 33 percent from on-road vehicles (Appendix D). However, on-road emissions are expected to drastically decline under ACCII[3] and ACF policies, resulting in off-road emissions accounting for a much greater share of construction emissions by 2045 (96 percent off-road and 4 percent on-road). Because ACCII and ACF generally do not apply to off-road construction equipment and recognizing that construction is Valley Water's largest emissions sector, reducing emissions from off-road construction equipment is a crucial step towards achieving Valley Water's agency-wide emission reduction goals. On-road construction emissions are addressed under CN-2.

As discussed under OF-1 and Appendix C, technology and zero-carbon fuels for off-road equipment are currently available and are anticipated to become more prevalent in the future. For projects where Valley Water operates its own off-road fleet, OF-1 would be implemented. However, for contracted construction projects, Valley Water may not control contractors' fuel selection and use of equipment, but it can require in its contract terms that contractors use a certain percentage of zero-emission equipment or use available renewable diesel and require regular reporting of the equipment inventory and fuel usage to Valley Water. To allow for flexibility, the contractor may use any combination of technology or fuels to meet these requirements. Under CN-1, Valley Water would target 17 percent of zero-emission fuel use by off-road construction equipment by 2030 and 70 percent by 2045.

Additionally, in support of this measure, supporting actions include consideration of project design.

2030 Target	2045 Target
17% zero-emission fuel use in contracted off-road construction equipment by 2030.	70% zero-emission fuel use in contracted off-road construction equipment by 2045.
Cumulative Reduction Potential by 2030:	**Cumulative Reduction Potential by 2045:**
2,818 $MTCO_2e$	**40,201 $MTCO_2e$**

[3] The status of ACCII is currently pending litigation. Until finalized by courts, forecasts assume that ACCII is in effect, per CARB recommendations. (CARB 2025; Islam, pers. comm., 2025)

- **Quantified Action CN-1.1**: Update internal capital project specifications to reduce GHGs through the Technical Review Committee, including fleet and equipment specifications for contractors. This should include a requirement for construction projects to require contractors to apply all feasible construction best management practices (BMPs) to reduce GHG emissions as recommended by the Bay Area Air District in Table 6-1 of the 2022 CEQA Guidelines or the latest analogous set of BMPs. This list of BMPs is included as part of the GHGRP Consistency Review Checklist in Appendix B. Of the recommended BMPs, require that zero-emission fuels account for at least 17 percent of construction off-road fuel use by 2030 and 70 percent by 2045. Given the planning required for construction projects and the time needed for contractors to procure and plan for these requirements, begin the revision to the contract requirement policy process as soon as possible.
- **Supportive Action CN-1.2:** Require as part of construction contracts that contractors submit an annual report of fuel usage in the off-road equipment used on site (e.g., gallons of renewable diesel, gallons of conventional diesel, kWh of electricity and name of utility from which electricity is purchased).
- **Supportive Action CN-1.3:** Incorporate process-based geomorphic channel designs into capital projects and use natural energy (e.g., existing natural waterways and gravity-fed systems) and local materials.

<u>Calculation Assumptions</u>

This measure assumes that 17 percent of forecasted conventional diesel fuel use in off-road construction equipment would be replaced by zero-emission fuels by 2030 and 70 percent by 2045. See Measure OF-1 above for a discussion of eligible types of zero-emissions fuel; those same assumptions apply to this measure as well.

CN-2: Zero Emission On-Road Construction Vehicles

For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional fuel in 35% of on-road construction vehicle fuel use by 2030, and 100% by 2045.

On-road construction vehicle emissions account for 33 percent of construction-related emissions and are expected to drastically decline under ACCII and ACF policies. On-road construction vehicles consists of medium- and heavy-duty trucks used for transporting building materials, equipment, and waste or earth hauling as well as worker commute and light-duty trucks. The heavier-duty vehicles typically use conventional diesel. However, heavy-duty ZEVs and zero-carbon fuels, including renewable diesel, for on-road vehicles, are currently available and will become more prevalent in the future, as noted in Appendix E. Under ACF, some heavy-duty fleets are required to purchase only ZEVs starting in 2024. Worker commute vehicles are excluded from this measure. For projects where Valley Water operates its own on-road fleet, VF-1 would be implemented. However, for contracted construction projects, Valley Water may not control contractors' selection of vehicles, but it can require in its contract terms that contractors use a certain percentage of ZEVs, use available zero-carbon fuels, and require regular reporting of the on-road vehicle mileage and fuel usage to Valley Water. Under CN-1, Valley Water would require that 35 percent of on-road construction fuel use be from zero-carbon sources (e.g., electricity, renewable diesel) by 2030 and 95 percent by 2045.

2030 Target	2045 Target
35% zero-emission fuel use in contracted on-road construction vehicles by 2030.	100% zero-emission fuel use in contracted on-road construction vehicles by 2045.
Cumulative Reduction Potential by 2030:	Cumulative Reduction Potential by 2045:
446 $MTCO_2e$	1,805 $MTCO_2e$

- **Quantified Action CN-2.1**: Update internal capital project specifications to reduce GHGs, including on-road fleet specifications for contractors. This should include a requirement for construction project contractors to apply all feasible construction best management practices (BMPs) for the purposes of reducing GHG emissions as recommended by the Bay Area Air Quality Management District in Table 6-1 of the 2022 CEQA Guidelines, or the latest analogous set of BMPs. This list of BMPs is included as part of the GHGRP Consistency Review Checklist in Appendix B. Of the recommended BMPs, require that zero-emission fuels or technologies account for at least 35 percent of construction on-road fuel use by 2030 and 95 percent by 2045. Given the planning required for construction projects and the time needed for contractors to procure and plan for these requirements, begin the revision to the contract requirement policy process as soon as possible.
- **Supportive Action CN-2.2:** Incorporate process-based geomorphic channel designs into capital projects and local materials to reduce transportation-related emissions.

<u>Calculation Assumptions</u>

As a baseline, the legislative-adjusted forecast for this measure assumes that ACCII and Advanced Clean Fleets increase the proportion of ZEVs in the on-road construction fleet. Under these rules, it is estimated that, by 2030, 73 percent of on-road heavy-duty construction vehicles would be fueled by conventional diesel and, by 2045, only 7 percent of heavy-duty vehicles would be fueled by diesel. Under this measure, the percentage of diesel-powered on-road construction fuel would be reduced to 65 percent by 2030 and 5 percent by 2045.

WA-1: Community-Wide Water Conservation

Conserve 98,800 acre-feet of water per year by 2030 and 118,000 acre-feet by 2045.

As part of its commitment to environmental stewardship, and pursuant to Board Ends Policy 2.1.5 ("Maximize water use efficiency, water conservation and demand management opportunities") and the Water Supply Master Plan 2040, Valley Water is targeting the conservation of 98,800 acre-feet (AF) of water per year by 2030 and 118,000 AF per year by 2045, up from the current rate of approximately 85,000 AF per year by 2030. This increased conservation would result from current and planned conservation activities and programs. These include landscape rebate programs (e.g., rebates for turf conversion, irrigation equipment upgrades, and rainwater capture projects, including rain barrels), incentives to update plumbing and irrigation equipment to more water-efficient versions (including products labeled by the Environmental Protection Agency WaterSense Program), and technical services to increase water-use efficiency indoors and outdoors. This conservation, in turn, results in decreased electricity use from water pumping and treatment activities incurred by Valley Water's retail customers (e.g., San Jose Water Company, City of Sunnyvale) and an associated decrease in greenhouse gas emissions. Additionally, end users at residential, commercial, industrial, and institutional properties can decrease their electricity used for water heating by participating in Valley Water's conservation programs that incentivize water-efficient plumbing (like showerheads, faucet aerators, etc.) . Although the emissions from retail customer pumping and treatment are not included in Valley Water's emissions inventory, these reductions would not occur without Valley Water's water conservation actions. Thus, this reduction is considered a Scope 3 emissions reduction similar to reductions associated with carbon sequestration, which are also not directly included in Valley Water's emissions inventory.

2030 Target	2045 Target
98,800 acre-feet of water conserved per year	118,000 acre-feet of water conserved per year
Cumulative Reduction Potential by 2030:	**Cumulative Reduction Potential by 2045:**
1,448 $MTCO_2e$	**4,263 $MTCO_2e$**

- **Quantified Action WA-1:** Increase implementation of water-saving programs and incentives, in keeping with Board Ends Policy 2.1.5 and the Water Supply Master Plan 2040.

<u>Calculation Assumptions</u>

The conservation program goals to reduce water use by 118,000 AF per year by 2045 (with other intermediate goals) is achieved through Valley Water's conservation programs and through policies and regulatory requirements. Emissions reductions are only accounted for the conservation directly attributable to Valley Water's programs, estimated to be 25 percent of total conservation savings. Therefore, this measure was assumed to save 22,000 acre-feet of water per year over existing annual conservation savings (based on data from the Water Supply Master Plan [Valley Water 2019]) and 30,000 additional annual conservation savings by 2045 (07/09/2024 Valley Water Board Meeting, Item 6.1). Emissions reductions per acre-foot from water conservation were calculated using the sum of:

1) A weighted average emissions factor (0.005 $MTCO_2e$ per AF in 2030) reflecting the 2030 anticipated mix of water supply sources – per the Water Supply Master Plan (Valley Water 2019) – and their associated emissions factors. This weighted average emissions factor is associated with the extraction and conveyance of water delivered by Valley Water to the retailers. These are emissions associated with pumping water from the source to Valley Water. Sources include natural groundwater recharge, local surface water, recycled water, water from the San Francisco Public Utilities Commission, and Delta-Conveyed water from the Central Valley Project and State Water Project. Depending on hydrological conditions, the State Water Project sometimes purchases non-renewable energy to pump water, and thus it has nonzero emissions in 2030

(however, per SB 1020, SWP as a State agency must procure 100 percent zero-carbon resources by 2035; its emissions factor in 2030 was interpolated accordingly). All other sources have an emissions factor of zero, due to Valley Water's Zero Carbon Water energy portfolio from PWRPA as well as the Central Valley Project using carbon-free hydroelectric energy to pump. See Appendix D, Inventory and Forecasting Technical Memo, for details on emissions factors for local and imported water.

2) An average emissions factor (0.05 $MTCO_2e$ per AF in 2030) for water treatment and distribution by the local water retailers to whom Valley Water delivers wholesale quantities of water, assuming that all water conservation avoids potable water use.

The emissions factors for extraction and conveyance were calculated using data from the Water Supply Master Plan 2040 and forecast emission factors for the water sources listed above (see Appendix D, Inventory and Forecast Technical Memo for more details on how these were derived).

The emissions factors for treatment and distribution were calculated using Valley Water's customer data on volumes delivered by retailers (Valley Water 2021c: 32). These were used in conjunction with estimated 2030 electricity emissions factors for each local utility (based on 2022 emissions factor data from the California Energy Commission Power Content Labels, extrapolated to 2030 values assuming a carbon neutrality target of 2045), as well as energy intensity factors for water (CEC 2024, Next10 2021: 19). Table 6 below shows the values used for this calculation.

Table 6 Data Used to Calculate Emissions Factors for Treatment and Distribution of Water

Water Provider	Corresponding Utility Provider	Total acre-feet per year from Valley Water (2017-2021 annual average)	2030 emissions factors (lb CO_2e per MWh)	Energy intensity of pumping: kWh per acre-foot per year
CWS Los Altos	SVCE	12,108	46	1,214
City of Morgan Hill	SVCE	7,340	46	1,011
City of Gilroy	SVCE	7,890	46	1,086
City of Mountain View	SVCE	9,544	46	968
City of Sunnyvale	SVCE	18,951	46	1,064
City of Milpitas	SVCE	9,153	46	989
San Jose Water Company	SJCE	115,119	76	1,193
San Jose Municipal Water	SJCE	16,997	76	1,021
Great Oaks Water Company	SJCE	10,436	76	1,150
City of Palo Alto	City of Palo Alto Utilities	10,856	283	1,075
City of Santa Clara	City of Santa Clara DBA Silicon Valley Power	18,110	345	1,118
Total		**236,503**	**NA**	**NA**

Notes: lb CO_2e per MWh = pounds of carbon dioxide equivalent per megawatt-hour; kWh = kilowatt-hour; CWS = California Water Service; SVCE = Silicon Valley Clean Energy; SJCE = San Jose Clean Energy; DBA = Doing Business As.

Source: Prepared by Ascent in 2024.

CS-1: Carbon Sequestration

Sequester carbon in habitat enhancement and restoration projects. Collaborate with regional conservation agencies to develop habitat enhancement and restoration above and beyond project mitigation requirements.

Carbon sequestration provides a natural sink of carbon emissions. Valley Water performs a variety of habitat restoration and enhancement projects as part of its mission. These include riparian habitat restoration and other native vegetation plantings that occur as part of stream maintenance activities or other projects. Additionally, Valley Water performs tidal marsh restoration in the South Bay that converts former salt production ponds to a mosaic of wetlands with an excellent ability to absorb carbon. Under existing conditions, salt ponds are primarily open water with minimal vegetation present on their margins. As such, their potential for carbon sequestration is low. On an acre-per-acre basis, wetland restoration can sequester approximately two times more carbon than planting trees (assuming 50 trees per acre) and 30 times more carbon than riparian restoration (see Appendix A). Due to the relatively high potential for salt pond restoration to sequester carbon, this measure assessment focuses on Valley Water's tidal marsh restoration projects.

One future Valley Water tidal marsh restoration projects was considered in this measure: the South San Francisco Bay Shoreline Phase I Project (Shoreline Phase I). Shoreline Phase I's goals are to provide horizontal levees, reduce flood risk, restore tidal marsh habitat, and provide trail connections in the area between the Alviso Slough and Coyote Creek (Valley Water 2024c). The first phase of flood protection components associated with the project are anticipated to be completed in 2025. Activities to prepare the salt ponds included in the project (Figure 9) for tidal marsh restoration will commence subsequently, with pond breaching anticipated to begin in 2030. This project will result in the restoration of approximately 2,783 acres of tidal marsh once pond breaches are fully implemented (USACE 2015:4-225). The majority of Shoreline Phase I land where restoration will occur is owned by the US Fish and Wildlife Service (USFWS) as part of the Don Edwards San Francisco Bay National Wildlife Refuge, with a portion owned by the City of San Jose. Implementation of Shoreline Phase I is partnership between Valley Water, the US Army Corps of Engineers (USACE), and the California State Coastal Conservancy (SCC), which are all contributing staff resources and funding towards restoration efforts.

In terms of the ownership of GHG reductions from carbon sequestration, it is possible that the current land owners and/or project partners could claim carbon sequestration reductions associated with Shoreline Phase I in future climate action plans. These claims could undermine the requirement for these reductions to be "additional" as defined under CEQA Guidelines Section 15183.5. Valley Water is currently in discussions with project partners to ensure that sequestration from Shoreline Phase I will not be double counted.

Depending on the outcome of negotiations with the landowners, Valley Water could account for a greater share of carbon sequestration than required to close its carbon budget gap as estimated in this GHGRP. Additional sequestration from other future restoration projects may be accounted for by Valley Water and utilized to offset construction-related emissions associated with future CIP projects (such as the Anderson Dam Seismic Retrofit Project) that require mitigation of GHGs as part of their CEQA compliance.

The carbon sequestration rate applied to estimate potential sequestration from Shoreline Phase I is based on data collected in Alameda County at Eden Landing Ecological Reserve, 12 miles north of the Shoreline Phase I project area. (Shahan et al. 2022). This study performed a wetland-specific assessment, evaluating not just the change in soil carbon and CH_4 emissions over time, but also the transfer of sequestered carbon into the bay through tidal eddies. Data was collected in fully restored tidal marshes that were previously salt ponds restored in a similar manner to the planned Shoreline Phase I restoration. Although a more specific study for tidal marshes in the southernmost San Francisco Bay is not currently available, the rates presented in this study were used as a proxy due to the proximity and similarity of ecological and pre-restoration conditions in the Shoreline Phase I and Eden Landing areas.

Additionally, to account for any uncertainty regarding tidal losses of carbon, an additional 50 percent reduction was applied to estimated lateral eddy loss rates[4].

While the Eden landing sequestration rate is locally specific, it only applies to a fully restored marsh. In reality, the actual rate of tidal marsh establishment after restorations are implemented is uncertain and dependent on a variety of factors such as the order in which berms are breached, the location of the removed berms, and the resulting sedimentation from flows from the bay and creeks. Previously restored salt ponds in the South Bay have seen tidal marsh establishment ranging from 7 to 100 percent of pond area within 13 years of pond breaching, with those bordering the bay having the fastest restoration rates (Valley Water 2015, Valley Water 2025). Based on these rates and the geographical similarities between the previously restored ponds and the planned Shoreline Phase I ponds, it is estimated that 82 percent, or 2,280 acres, of Shoreline Phase I ponds would be restored by 2045 (if breached in 2030).

Table 7 below shows the hypothetical amount of carbon sequestration that could be realized with the restoration of Shoreline Phase I, beginning with the breaching of the ponds in 2030. However, due to the uncertainty of how quickly restoration will actually occur in the Shoreline Phase I, the reductions presented in Table 7 are subject to change as Valley Water annually assesses it progress toward meeting carbon budget. See Appendix A for detailed calculations and assumptions behind the applied sequestration rates and the rates of restoration for each pond.

Table 7 Cumulative GHG Reductions from Valley Water Carbon Sequestration

Item	2025-2045
Sequestration from tidal marsh restoration (MT CO_2e / restored acre / year) [1]	3.58
Total Shoreline Phase I Acres	2,783
Estimated percent restoration by 2045 for Shoreline Phase I[2]	82%
Estimated restored acres of Shoreline Phase I	2,280
Average annual rate of restoration	5%
Potential Cumulative Reductions from Shoreline Phase I (MT CO_2e)	**60,063**
Carbon Budget Gap after Accounting for All Measures except for CS-1 and CS-2 (MT CO_2e)	**33,102**
Excess Reductions (MT CO_2e)	**26,961**

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

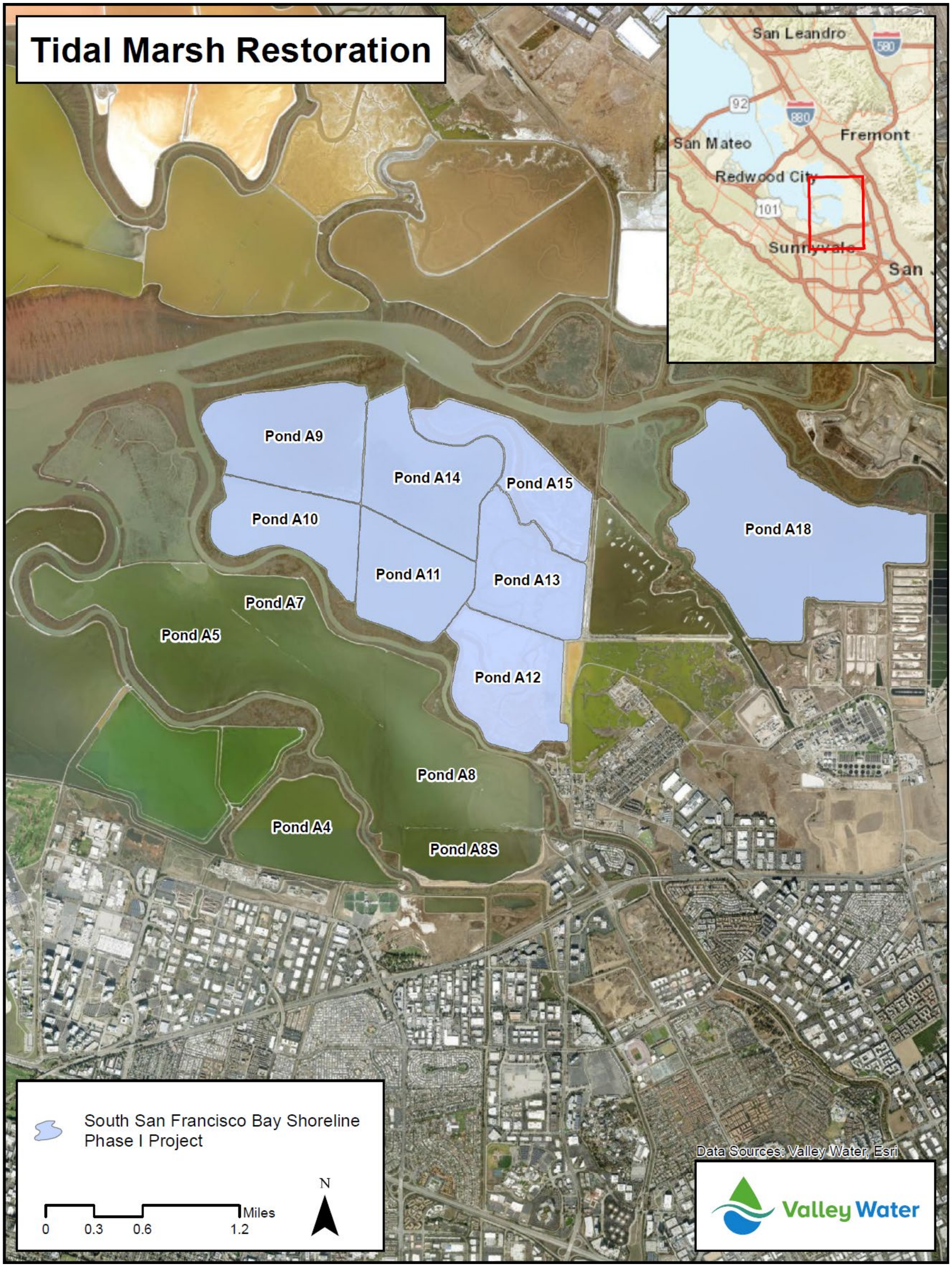
[1] Shahan et al. 2022. The sum of carbon sink and minor methane emissions and assumes a 50 percent loss in carbon sequestered to lateral eddies. See Appendix A for calculations.

[2] Assuming ponds are breached starting in 2030.

Source: Modeled by Ascent Inc. in 2025.

Although the restoration of Shoreline Phase I would not take place until 2030, the proximity of the ponds to the bay (see Figure 9) would likely allow those ponds to revegetate at a rapid pace once berms are breeched. Based on the analysis conducted, the estimated cumulative carbon sequestration from this restoration effort could help Valley Water meet its carbon budget with a buffer of nearly 30,000 $MTCO_2e$ to allow for variability in operational emissions and restoration work. Additionally, Valley Water is planning to restore a minimum of another 1,000 acres of salt ponds in future years, though the timing of those restoration activities is unknown at this time and not accounted for in this measure.

[4] According to Shahan et al. 2022, approximately 40 percent of carbon sequestered by tidal marshes is transported laterally into the San Francisco Bay with the tide as dissolved CO_2. However, the study does not indicate the fate of the exported CO_2, whether it will remain dissolved in water or return to the atmosphere, and notes that further study is needed in this area; therefore, it was conservatively assumed that 50 percent of this dissolved CO_2 is returned to the atmosphere.



Source: USACE 2015.

Figure 9 Valley Water Tidal Marsh Restoration Areas under Shoreline Phase I

Although this assessment focuses on Shoreline Phase I, the intent of the measure is to allow Valley Water to achieve its carbon sequestration goals through any type of vegetative restoration work under its purview, including additional tidal marsh restoration, so long as the work is real, quantifiable, additional, enforceable, verifiable, and permanent, consistent with Division 25.5 (commencing with Chapter 38500) of the Health and Safety Code. The calculations shown in Table 7 demonstrate the sequestration potential available.

2030 Target	2045 Target
Valley Water restores 50 acres of tidal marsh	Valley Water restores 2,280 acres of tidal marsh
Cumulative Reduction Potential by 2030:	**Cumulative Reduction Potential by 2045:**
179 $MTCO_2e$	**60,063 $MTCO_2e$**

- **Supportive Action CS-1.1**: Prior to accounting for any carbon sequestration in future GHG inventories, Valley Water would establish an internal carbon sequestration registry that tracks the additional carbon sequestration derived from Valley Water projects. These projects can be any type of vegetative restoration work, so long as the work is real, quantifiable, additional, enforceable, verifiable, and permanent, consistent with Division 25.5 (commencing with Chapter 38500) of the Health and Safety Code. These terms are defined as follows (CARB 2021):
  - **"Real"** means, in the context of sequestration projects, that GHG reductions or GHG enhancements result from a demonstrable action or set of actions, and are quantified using appropriate, accurate, and conservative methodologies that account for all GHG emissions sources, GHG sinks, and GHG reservoirs within the offset project boundary and account for uncertainty and the potential for activity-shifting leakage and market-shifting leakage.
  - **"Quantifiable"** means, in the context of purchased offset and sequestration projects, the ability to accurately measure and calculate GHG reductions or GHG removal enhancements relative to a project baseline in a reliable and replicable manner for all GHG emission sources, GHG sinks, or GHG reservoirs included within the offset project boundary, while accounting for uncertainty and activity-shifting leakage and market-shifting leakage.
  - **"Additional"** means, in the context of purchased offset and sequestration projects, greenhouse gas emission reductions or removals that exceed any greenhouse gas reduction or removals otherwise required by law, regulation or legally binding mandate, and that exceed any greenhouse gas reductions or removals that would otherwise occur in a conservative business-as-usual scenario.
  - **"Enforceable"** means the authority for CARB to hold a particular party liable and to take appropriate action if any of the provisions of this article are violated.
  - **"Verifiable"** means that purchased offset and sequestration data is well documented and transparent such that it lends itself to an objective review by an accredited verification body.
  - **"Permanent"** means, in the context of purchased offset and sequestration projects, either that GHG reductions and GHG removal enhancements are not reversible, or when GHG reductions and GHG removal enhancements may be reversible, that mechanisms are in place to replace any reversed GHG emission reductions and GHG removal enhancements to ensure that all credited reductions endure for at least 100 years.

The calculations shown above in Table 7 provide projections of potential future sequestration enhancements that would occur after the implementation of the Shoreline Phase I. A registry developed by Valley Water must track the size and type of restoration activity being conducted and will use the most accurate, scientifically sound sequestration rates available. The registry will check against the targets established under CS-1.1 or provide a stopgap for any emissions exceeding the carbon budget.

Specific Valley Water projects may already implement restoration activities as compensatory mitigation required by permits from USACE, RWQCB, and/or CDFW. The carbon sequestered by these restoration activities can only be counted toward the reductions under CS-1 if they meet the above-bulleted requirements. Thus, the carbon sequestration from those projects must be quantifiable, enforceable, verifiable, and permanent, and also:

- Not already be credited to a separate entity or project outside of CS-1 (e.g., another agency or another Valley Water project that is not directly supporting CS-1) and
- Result in additional carbon sequestration above and beyond any vegetation removal of the project itself, such that only the net additional carbon sequestration can be credited toward CS-1 (e.g., only account for the net increase in annual carbon sequestration between a loss of 10 acres of invasion vegetation compared to 30 acres of restored riparian habitat).

Calculation Assumptions

According to a study conducted at a similar salt pond restoration project in the eastern part of the San Francisco Bay (Bay) at Eden Landing Ecological Reserve, restoration of salt ponds in the Bay could sequester on average 407 grams of carbon per square meter per year or 6 $MTCO_2e$ per acre per year (Shahan et al. 2022).

The 6 $MTCO_2e$ per acre per year value was adjusted downward to 3.6 $MTCO_2e$ per acre per year. This is a conservative assumption to account for the carbon lost laterally (i.e., that flows offsite) after restoration work. Details of this calculation appear in Appendix A, Measures Calculations.

In addition to the tidal marsh restoration projects used in the calculation above, Valley Water also performs other activities that promote carbon sequestration, such as revegetation in degraded riparian areas and tree planting. The pace and scale of these activities and associated carbon sequestration potential have not been quantified in this GHGRP. Pending data availability, these activities could also count as reducing emissions under this measure and will continue to be tracked and monitored throughout the lifetime of the GHGRP.

CS-2: Purchase Carbon Offsets

If necessary, purchase carbon offsets from verified offset registries, prioritizing local or regional projects and, if necessary, projects outside of the state, but within the United States. Prohibit carbon offset purchases that are unverified or located in locations outside the United States.

The success of all previous measures is dependent on funding availability and technical feasibility, such as the availability of renewable diesel for construction projects or the available reductions from restoration projects under CS-1. As a last resort to ensure that Valley Water can meet its GHG reduction targets if estimated reductions from previous measures do not occur, Valley Water may purchase carbon offsets. Purchases may occur at its discretion, following an assessment of Valley Water's remaining carbon budget (discussed further in Chapter 9), depending on the progress of the implementation of Measures VF-1 through CS-1.

Any offsets procured under Measure CS-2 must be voluntary and not otherwise required by law or regulation (CEQA Guidelines §15126.4(c)(3)), must avoid double counting, and must not be used to satisfy any compliance obligation. Geographic preference will be given using the following preference hierarchy: offsets originating within the San Francisco Bay Area Air Basin; offsets originating within California; and offsets originating within other U.S. states. While offset purchases associated with Measure CS-2 cannot be procured from CARB's Compliance Offset Program[5], any offsets procured must meet requirements at least as strict as California's under CEQA. All offsets must meet the validation criteria set forth in 17 CCR §95802, offset protocols must be consistent with CARB requirements under 17 CCR §95972, and be registered with a recognized and reputable registry (e.g., Climate Action Reserve, American Carbon Registry, or Verra). Offsets from outside the United States will not be purchased.

[5] The Compliance Offset Program is an element of CARB's Cap and Invest (formerly Cap and Trade) Program, to which Valley Water is not subject .

9 IMPLEMENTATION AND MONITORING PLAN

This chapter outlines the steps needed to ensure that the specific measures and actions identified in this GHGRP will be successfully implemented and that Valley Water's emissions stay within the carbon budget, once the plan is completed and adopted. The chapter is divided into three parts: 1) the agency-wide implementation, monitoring, and reporting process; 2) details for measure implementation; and 3) the CEQA checklist process for Valley Water projects intended to tier from this CEQA-qualified plan.

9.1 IMPLEMENTATION, MONITORING, AND REPORTING PROCESS

Successfully implementing the GHGRP will require an agency-wide evaluation of Valley Water's progress toward meeting its GHG reduction targets by staying with its carbon budget through 2045. This would be done through an annual implementation, monitoring, and reporting process that would parallel measure implementation. A key aspect of this process, summarized in Figure 10 and detailed in a flow chart in Appendix F, is an adaptive management approach where Valley Water evaluates its emissions activity drivers and GHG emissions annually. Using this information, Valley Water would assess whether it is on track to meet its carbon budget, applying reductions available from measure CS-1 and purchasing carbon offset credits via CS-2. Offset purchases may occur on an as-needed basis depending on emissions trends related to the carbon budget (i.e., in some years, no offsets may be purchased, but may be purchased in others). Additionally, any new projects that were not included in this GHGRP could be used, at Valley Water's discretion, to update the forecast and recalculate the budget accordingly. This process would allow Valley Water to identify opportunities to improve measures and see which ones are being implemented behind or ahead of schedule. This process is outlined in Figure 10 and detailed below.

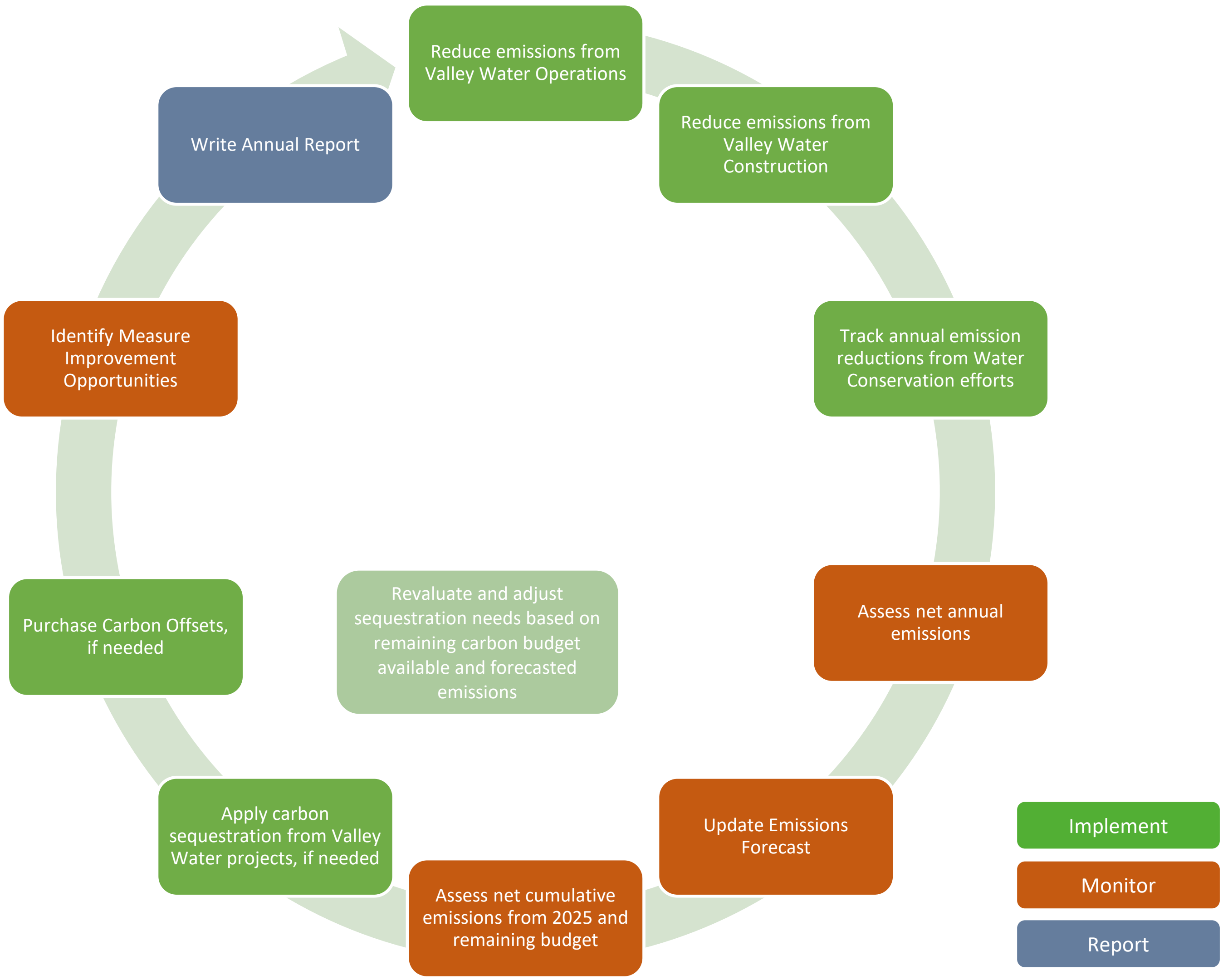
In addition to the annual process shown in Figure 10, Valley Water will update the GHGRP every five years to incorporate updates to its inventory and forecast, the latest technological developments in GHG reduction measures (e.g., the availability of zero-emissions construction equipment), regulatory changes, and Valley Water's capital improvement projects. This update process will allow Valley Water to refine its GHG reduction measures and actions to account for changing construction project schedules, market conditions, costs, and technological developments.

9.2 MEASURE IMPLEMENTATION DETAILS

Once the GHGRP is adopted, Valley Water will begin implementing the measures in order of effectiveness and the level of control Valley Water has over those emissions, starting with measures associated with Valley Water's direct operations, then moving on to measures over which Valley Water has a decreasing level of control. The role of the sequestration and offset-related measures (CS-1 and CS-2) will depend on the outcome of the annual assessment process (Figure 10).

9.2.1 Implementation Order

Valley Water has the most control over its Scope 1 and 2 emissions. Since its Scope 2 emissions are already minimal, Valley Water plans to prioritize Scope 1 emissions for reductions, subject to future feasibility and cost constraints. Because Valley Water does not have direct control over Scope 3 emissions, these are more difficult to reduce; however, this GHGRP proposes that Scope 3 reductions be prioritized in the order shown in Table 8. This order considers the certainty of reductions that can be achieved and the degree of influence that Valley Water has over measure implementation. A higher rank on the list implies more direct control and more certainty of achieving reduction; a lower rank implies less control and less certainty. A prioritization matrix that addresses the feasibility, relative cost, and GHG reduction potential for each measure is included in Appendix G.



Source: Prepared by Ascent in 2024.

Figure 10 Annual Implementation, Monitoring, and Reporting Process

Table 8 Recommended Measure Implementation Order

Implementation Order	Applicable Measures	Implementation Action
1	VF-1 through SW-1	Reduce Valley Water's operational emissions. Prioritizing measures with the greatest GHG reduction effectiveness and feasibility (See Appendix G).
2	CN-1 and CN-2	Reduce construction emissions by revising the requirements for contractors responding to Valley Water's requests for proposals (RFPs). These requirements should mandate that a certain percentage of on-road and off-road fuel used in construction be zero-emission.
3	WA-1	Continue to promote water conservation to achieve the conservation goals set by the Water Supply Master Plan. This involves influencing end-users to consume less water by scaling up existing programs, incentives, and rebates, as well as developing new programs.
4	CS-1	If the measures listed in the three rows above fail to keep Valley Water's emissions within the carbon budget, implement carbon sequestration projects in natural lands. These projects can include tidal marsh restoration, riparian restoration, and tree planting. Valley Water plans to partner with other organizations, such as the Army Corps of Engineers and the United States Fish and Wildlife Service (USFWS), to complete the tidal marsh restoration projects. Because these are shared projects and those organizations may want to claim carbon reductions for themselves in future climate action planning work, it is not possible to quantify Valley Water's share of those reductions at this time. This GHGRP, therefore, calculates the minimum reduction that Valley Water would have to receive to stay within its carbon budget. Details on this calculation are provided in "8.1 Measure Details."
5	CS-2	Purchase carbon offsets to close any remaining gap between actual emissions and the budget.

Source: Compiled by Ascent in 2024

9.2.2 Implementation of Individual Measures

Implementing the individual measures will require a coordinated effort across Valley Water and a detailed plan for monitoring implementation progress for each measure. A key step is forming a **GHGRP Implementation Team** to coordinate all aspects of Plan implementation, such as oversight of reduction measures, regular assessment of GHG reduction progress, preparation of annual reports, and acquiring carbon credits, as necessary. Below are some key actions that will implement each GHGRP measure:

- **Define roles and responsibilities** for each measure, describing how the specific Valley Water programs, units, or teams will work together to implement the measures, including roles, responsibilities, and expected work products.
- **Develop a monitoring plan** that details how data on the tracking metrics (i.e., emissions activity data) will be collected and analyzed.
- **Develop enforcement mechanisms** that modify Valley Water policies and processes to ensure compliance with reduction measures.
- **Seek and source of funding** for each measure's implementation. This generally combines Valley Water's operations, capital improvement programs, grants, and incentives.

A table summarizing how these actions apply to each measure can be found in Appendix E. Specific plans for each measure will be developed after the GHGRP is adopted.

9.3 CEQA CHECKLIST FOR DISCRETIONARY PROJECTS

To ensure that proposed discretionary projects and their associated construction-related emissions are on track for reductions consistent with this GHGRP, Valley Water will collect data from each of its future construction projects on the anticipated types of vehicles to be used in construction, their annual hours of operation, and fuel usage (including both zero-emission and conventional fuels). Valley Water will then verify that these projects' emissions are consistent with this GHGRP using the process outlined in Appendix B, GHGRP Consistency Review Checklist (Checklist), and in Chapter 9.3.1. The Checklist is intended to document whether individual projects are minimizing GHG emissions in accordance with the applicable reduction measures from the GHGRP. Project consistency with the GHGRP can also be demonstrated through a quantitative analysis that shows the project will not impede the achievement of the GHG emissions reduction targets or cause Valley Water to exceed its carbon budget (explained further in 9.3.1). Projects that fulfill the criteria in this Checklist will be streamlined and allowed to proceed without additional GHG mitigation in accordance with CEQA Guidelines Sections 15064(h) and 1513.5(b)(2). Moving forward, this Checklist will serve as the tool to document a streamlined analysis of GHG impacts consistent with CEQA Guidelines Section 15183.5(b), which states:

> *Pursuant to sections 15064(h)(3) and 15130(d), a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.*

9.3.1 Determining Project Compliance with the GHGRP

Determining a project's compliance with the GHGRP, and subsequently, its alignment with the carbon budget is inherently an iterative process due to the uncertainty of future emissions. For Valley Water's construction emissions, the GHGRP's emissions forecast is based on a combination of known emissions from ongoing existing construction projects (e.g., Stream Maintenance Program) and an extrapolation of historical trends in construction activity. This methodology is used because specific future project emissions data are unknown and unavailable at this time. Thus, once project annual emissions data are known, Valley Water must evaluate its own operational emissions and analyze how the additional construction project emissions would impact Valley Water's cumulative carbon emissions starting in 2025. This is necessary because the carbon budget is calculated based on cumulative emissions from 2025 to 2045 (Chapter 7.1). Ground truthing Valley Water's carbon budget is essential to align reality with projections, ensuring that Valley Water is genuinely reducing emissions and also providing substantial evidence for project compliance with the GHGRP where needed.

Three outlined steps below provide a process for assessing consistency with the carbon budget for a new discretionary Valley Water project that begins its CEQA process after the adoption of this GHGRP, based on the implementation process shown in Figure 10.

- First, Valley Water conducts an annual assessment of its emissions and creates a running total of emissions from its existing activities (e.g., operations and ongoing construction) starting after 2025.
- Second, Valley Water annually assesses the status of the implementation of the GHGRP measures and determines their effectiveness in reducing emissions as they are implemented.
- Third, for every new project that undergoes discretionary CEQA review, the estimated annual emissions from those projects will be added to the forecasted emissions reported in this GHGRP and evaluated for their effect on Valley Water's cumulative emissions.

For the third step, Valley Water will evaluate the contribution of the new project emissions in terms of how it affects Valley Water's cumulative emissions from 2025, alongside the concurrent implementation of the GHGRP measures. If new projects are expected to cause Valley Water's carbon budget to be exceeded before 2045, Valley Water would assess if additional reductions from operations and construction through the GHGRP measures, including CS-1, are needed to balance or offset the new project emissions. If the reductions cannot offset the new project emissions to keep Valley Water under its carbon budget prior to 2045, then the new project would be deemed inconsistent with the GHGRP and Valley Water must either find additional reductions to be consistent with the carbon budget or reject or revise the proposed project. An example assessment of the consistency of hypothetical future projects with the carbon budget is provided in Appendix H.

10 CONCLUSION

Reducing GHGs supports Valley Water's mission and its role in responding to climate change. This GHGRP outlines strategies and actions Valley Water may take to reduce GHG emissions on the path to carbon neutrality. As 100 percent renewable electricity becomes commonplace, the importance of reducing emissions from Valley Water's electricity-reliant pumping activity, which historically dominated the agency's emissions profile, has been minimized. In contrast, reducing emissions from construction activities and other non-electric sources is now a key priority. This GHGRP identifies effective measures to reduce further Valley Water's emissions from fossil fuel use in Valley Water facilities, vehicles, and equipment, as well as in contracted construction vehicles and equipment. Requirements for future projects to assess consistency with this CEQA-qualified plan will address construction-related emissions. Supporting the implementation of projects to enhance carbon sequestration locally in Santa Clara County represents an important opportunity to address forecasted operational and construction emissions and an alternative to purchased carbon offsets.

Despite the uncertainty behind the availability of technology and infrastructure solutions, Valley Water will pursue emissions reductions in these areas to the extent feasible. Additionally, Valley Water's commitment to water conservation and habitat restoration provides opportunities to reduce Valley Water's emissions further. Implementing these actions where feasible, combined with regular monitoring and reporting, will ensure that Valley Water achieves its carbon neutrality goal.

11 REFERENCES

Bay Area Air District. 2022. California Environmental Quality Act Air Quality Guidelines. Appendix C: Guidance for GHG Reduction Strategies. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-c-ghg-reduction-strategies_final_edits-for-ascent-pdf.pdf?rev=8e5bb7d8ad504dd6accd3c04e58bdf87&sc_lang=en. Accessed March 1, 2024.

California Air Pollution Control Officer Association. 2021. *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity*. Available: https://www.caleemod.com/handbook/full_handbook.html. Accessed March 1, 2024.

California Energy Commission. 2024. 2022 Power Content Labels – Sortable Table. Available: https://www.energy.ca.gov/media/9281. Accessed July 23, 2024.

CalRecycle. 2023. *State of Disposal and Recycling in California*. Available: https://calrecycle.ca.gov/reports/stateof/. Accessed January 29, 2024.

CAPCOA. *See* California Air Pollution Control Officer Association.

CARB. *See* California Air Resources Board.

California Air Resources Board. 2007. California Greenhouse Gas Inventory (millions of metric tonnes of CO2 equivalent) — By Sector and Activity. Available: https://ww2.arb.ca.gov/sites/default/files/classic/cc/ghg_inventory_sector_all_90-04_AR4.pdf. Accessed September 12, 2025.

———. 2021. Cap-And-Trade Regulation (Unofficial Electronic Version). Available: https://ww2.arb.ca.gov/sites/default/files/2021-02/ct_reg_unofficial.pdf. Accessed November 5, 2024.

———. 2022a. 2022 Draft Scoping Plan Update. Available: https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp.pdf. Accessed October 19, 2023.

———. 2022b. California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators. Available: https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf. Accessed January 24, 2024.

———. 2023a. Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation. Available: https://ww2.arb.ca.gov/resources/fact-sheets/fact-sheet-renewable-diesel-fuel-requirements. Accessed January 24, 2024.

———. 2023b. SB 1206. Available: https://ww2.arb.ca.gov/our-work/programs/sb-1206/about. Accessed January 24, 2024.

———. 2024a. Climate Change. Available: https://ww2.arb.ca.gov/our-work/topics/climate-change. Accessed July 19, 2024.

———. 2024b. California Greenhouse Gas Emissions from 2000 to 2022: Trends of Emissions and Other Indicators. Available: https://ww2.arb.ca.gov/sites/default/files/2024-09/nc-2000_2022_ghg_inventory_trends.pdf

———. 2024c. High GWP Refrigerants. Available: https://ww2.arb.ca.gov/resources/documents/high-gwp-refrigerants. Accessed March 1, 2024.

———. 2025. Current Litigation. Available: https://ww2.arb.ca.gov/current-litigation. Accessed September 3, 2025.

CEC. *See* California Energy Commission.

Coachella Valley Water District. 2021. *Coachella Valley Water District Climate Action & Adaptation Plan*. Available: https://www.cvwd.org/DocumentCenter/View/5670/CVWD-Climate-Action--Adaptation-Plan-9282021?bidId=. Accessed February 9, 2024.

———. n.d. 2018-2019 Annual Review. Available: https://www.cvwd.org/ArchiveCenter/ViewFile/Item/738. Accessed July 18, 2024.

CVWD. *See* Coachella Valley Water District of Southern California.

DOE. See US Department of Energy.

EPA. *See* US Environmental Protection Agency.

Greenhouse Gas Protocol. 2024. IPCC Global Warming Potential Values. Available: https://ghgprotocol.org/sites/default/files/2024-08/Global-Warming-Potential-Values%20%28August%202024%29.pdf. Accessed February 25, 202.

Islam, Mohammad. Air Resources Engineer. California Air Resources Board, Sacramento, CA. August 28, 2025—email response to Brenda Hom of Ascent regarding question on impact of call for EPA waiver removal by the U.S. Department of Justice.

Local Governments for Sustainability. 2013. U.S. Community Protocol, Appendix E: Wastewater and Water Emissions activities and Sources. Available: https://icleiusa.org/us-community-protocol/.

Metropolitan Water District of Southern California. 2022. *Climate Action Plan.* Available: https://www.mwdh2o.com/media/12469/final-cap.pdf. Accessed February 9, 2024.

Mozingo, Louis. *Zero-Carbon Buildings in California: A Feasibility Study.* 2021. Available: (https://www.researchgate.net/profile/Carrie-Brown-12/publication/359931845_Zero-Carbon_Buildings_in_California_A_Feasibility_Study/links/649caec295bbbe0c6efda59e/Zero-Carbon-Buildings-in-California-A-Feasibility-Study.pdf?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19. Accessed January 29, 2024.

MWD. *See* Metropolitan Water District of Southern California.

Next10. 2021. The Future of California's Water-Energy-Climate Nexus. Available: https://www.next10.org/sites/default/files/2021-09/Next10-Water-Energy-Report_v2.pdf. Accessed July 24, 2024.

Santa Clara Valley Water District. 2015. Island Ponds Mitigation Monitoring and Reporting Year 10.

———. 2019. *Water Supply Master Plan 2040. Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/Water_Supply_Master_Plan_2040_11_01_2019_v3.pdf.* Accessed July 15, 2024.

———. 2021a. *Climate Change Action Plan.* Available: https://fta.valleywater.org/dl/WE26jeeXbS. Accessed January 24, 2024.

———. 2021b. *2020 Annual Report: Large Landscape Program.* Available: https://www.valleywater.org/sites/default/files/2020%20WaterfluenceAnnualReport%20ValleyWater%202-26-2021.pdf. Accessed July 18, 2024.

———. 2021c. Water Conservation Strategic Plan. Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/Water%20Conservation%20Strategic%20Plan.pdf. Accessed July 23, 2024.

———. 2023 (June). *Five Year Capital Improvement Program, Fiscal Year 2024-28.* Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/2023-06/CIP_Tab-01_061423_LS.pdf. Accessed January 24, 2024.

———. 2024a. Monthly Water Tracker. Available: https://www.valleywater.org/your-water/water-supply-planning/monthly-water-tracker. Accessed November 5, 2024.

———. 2024b. Minutes from Santa Clara Valley Water District Water Supply and Demand Management Committee Meeting, May 17, 2024. Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/051724%20%20WSDMC%20Agenda%20Packet.pdf. Accessed July 18, 2024.

———. 2024c. South San Francisco Bay Shoreline Project Fact Sheet. Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/2024-09-05_San%20Francisco%20Bay%20Shoreline%20Project_Fact%20Sheet_LS_v3.pdf. Accessed November 6, 2024.

———. 2025. *Calabazas/San Tomas Aquino Creek–Marsh Connection Project Final Feasible Alternatives Report*. Prepared by Stillwater Sciences.

Shahan, J., H. Chu, L. Windham-Myers, M. Matsumura, J. Carlin, E. Eichelmann, E. Stuart-Haentjens, B. Bergamaschi. 2022 (September 15). "Combining Eddy Covariance and Chamber Methods to Better Constrain CO2 and CH4 Fluxes Across a Heterogeneous Restored Tidal Wetland." *JGR Biogeosciences* 127 (9). Available: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2022JG007112. Accessed March 1, 2024.

USACE. *See* US Army Corps of Engineers.

US Army Corps of Engineers. 2015. *South San Francisco Bay Shoreline Phase I Study Final Integrated Document Final Interim Feasibility Study with Environmental Impact Statement / Environmental Impact Report*. Prepared by HDR Engineering. Sacramento, CA. Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/E7_Final%20Integrated%20Document.pdf. Accessed July 10, 2025.

US Department of Energy. 2023. Alternative Fuels Data Center: Alternative Fuels Station Locator. Available: https://afdc.energy.gov/stations/#/analyze?country=US&region=US-CA&fuel=BD&fuel=RD. Accessed January 24, 2024.

US Environmental Protection Agency. 2023. Scope 1 and Scope 2 Inventory Guidance. Available: https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance. Accessed March 1, 2024.

Valley Water. *See* Santa Clara Valley Water District.

Young, Sarah. Senior Project Manager. Santa Clara Valley Water District, San Jose, CA. August 22, 2023—summary spreadsheet of projected fleet gasoline and diesel fuel usage to 2045; July 15, 2024—email message with Brenda Hom of Ascent regarding Valley Water's Tidal March Restoration areas.

Appendix A

Inventory, Forecast, and
Measures Calculations

Santa Clara Valley Water District Emissions Inventory and Forecast Tool
Version 1.9

Cell color coding used for individual sectors' inventory and forecast GHG emissions calculations

Inputs from Valley Water (generally hard-coded)
Measure assumptions
Emissions calculations (formulas)
Historical MT CO_2e Results
Forecast MT CO_2e Results
Measure MT CO_2e Results

Note: individual purchases of refrigerants and electricity usage by building have been redacted to preserve confidentiality. Aggregated totals only are presented for these sectors

Emissions Inventory and Forecast All values in the table below are metric tons of CO_2 equivalent.			Historical results														BAU Forecast		Leg-Adjusted Forecast	
Scope	**Emissions Sector**	**Link**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2017 - 2021 Baseline**	**2030**	**2045**	**2030**	**2045**
2	Facility Electricity Use	Facility Electricity Use	3,568	2,274	545	3,613	4,627	6,218	6,274	186	139	79	55	99	49	84	95	95	93	0
3	Imported Water	Imported Water	No data	No data	No data	No data	No data	2,950	9,636	11,411	4,958	7,766	1,156	2,213	4,017	4,022	4,174	4,222	1,372	0
1	High GWP Gases	High GWP Gases	111	123	28	56	79	79	79	79	79	79	79	79	79	79	79	79	79	79
3	Sediment Hauling	Sediment Hauling	No data	No data	No data	No data	No data	No data	No data	No data	No data	28	80	93	48	62	62	62	48	0
3	Business Travel	Business Travel	No data	No data	No data	No data	No data	No data	No data	No data	No data	67	227	Exclude - COVID	Exclude - COVID	147	147	147	131	104
3	Wastewater	Wastewater	No data	8	8	8	8	8	9	9	9	8	8	8	10	9	9	9	9	9
3	Solid Waste	Solid Waste	No data	225	211	215	222	221	236	244	239	216	225	232	268	236	236	236	236	236
1	Natural Gas Use In Buildings	Natural Gas Use In Buildings	735	758	667	797	691	571	587	566	642	786	747	768	784	745	745	745	745	745
3	Employee Commute	Employee Commute	No data	1,417	1,313	1,318	1,330	1,294	1,356	1,362	1,312	1,162	1,184	Exclude - COVID	Exclude - COVID	1,219	981	981	651	129
1	On-Road Fleet	On-Road Fleet	783	807	924	1,061	1,209	957	947	867	964	1,032	1,134	1,172	1,208	1,102	1,212	1,378	933	58
1	Off-Road Fleet	Off-Road Fleet	519	393	461	171	611	431	560	666	866	561	704	763	620	703	952	1,082	952	1,082
3	Construction	Construction	No data	618	5,149	3,917	3,979	4,102	4,266	4,969	5,856	6,638	8,108	7,228	7,123	6,990	8,115	8,115	7,408	5,629
	TOTAL		5,716	6,622	9,305	11,155	12,756	16,830	23,949	20,360	15,064	18,423	13,708	12,655	14,205	15,399	16,808	17,151	12,656	8,071

Note: High GWP Gas emissions in 2013 through the 2017-2021 baseline are based on the average emissions between 2009 and 2012. Data after 2012 were not readily available.

Valley Water Reported Emissions by High GWP gas, $MTCO_2e$

Year	HFC-134a	R-407C	Total
2009	83	28	111
2010	123	0	123
2011	0	28	28
2012	56	0	56

Valley Water Off-Road Fleet Activity and Emissions

Inventory

Year	Emissions Sector	Fuel Type	Fuel Amount	Fuel Units	Notes	Metric tons CO2e/ gallon	MTCO2e
2009	*Fleet-OffRoad*	*Diesel*	*48,888*	*gallons*		1.061E-02	519
2010	*Fleet-OffRoad*	*Diesel*	*37,031*	*gallons*		1.061E-02	393
2011	*Fleet-OffRoad*	*Diesel*	*43,430*	*gallons*		1.061E-02	461
2012	*Fleet-OffRoad*	*Diesel*	*16,075*	*gallons*		1.061E-02	171
2013	*Fleet-OffRoad*	*Diesel*	*57,538*	*gallons*		1.061E-02	611
2014	*Fleet-OffRoad*	*Diesel*	*40,592*	*gallons*	*data gap,5 year average used*	1.061E-02	431
2015	*Fleet-OffRoad*	*Diesel*	*52,729*	*gallons*		1.061E-02	560
2016	*Fleet-OffRoad*	*Diesel*	*62,779*	*gallons*		1.061E-02	666
2017	*Fleet-OffRoad*	*Diesel*	*81,564*	*gallons*		1.061E-02	866
2018	*Fleet-OffRoad*	*Diesel*	*52,907*	*gallons*		1.061E-02	561
2019	*Fleet-OffRoad*	*Diesel*	*66,349*	*gallons*		1.061E-02	704
2020	*Fleet-OffRoad*	*Diesel*	*71,929*	*gallons*		1.061E-02	763
2021	*Fleet-OffRoad*	*Diesel*	*58,446*	*gallons*		1.061E-02	620

Source:
Valley Water

Forecast

	Historical Gallons / Year	Extrapolated Future Gallons / Year (BAU and legislative adjusted)	BAU emissions (MTCO2e)	Leg-adjusted emissions (MTCO2e)
2009	*48,888*			
2010	*37,031*			
2011	*43,430*			
2012	*16,075*			
2013	*57,538*			
2014	*40,592*			
2015	*52,729*			
2016	*62,779*			
2017	*81,564*			
2018	*52,907*			
2019	*66,349*			
2020	*71,929*			
2021	*58,446*			
2030		89,720	952	952
2045		101,954	1,082	1,082

Valley Water Facility Natural Gas Emissions

Inventory

Year	Facility Name (Building or Pump)	Fuel Use	Energy Utility	Unit	Convert therms to MMBTU	CO2 Factor MT CO2 per MMBTU	CH4 Factor MT CH4 per MMBTU	N2O Factor MT N2O per MMBTU	CO2 Factor 100-year GWP (CO2)	CH4 Factor 100-year GWP (CH4)	N2O Factor 100-year GWP (N2O)	CO2e Methane Leakage emissions (MTCO2e per MMTBU)	MT CO2e	MT CO2e / Therm (For QA/QC)
2009	Natural Gas Uses for All Facilities	134,658	PG&E Natural Gas	Therms	13,466	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	735	5.460E-03
2010	Natural Gas Uses for All Facilities	138,852	PG&E Natural Gas	Therms	13,885	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	758	5.460E-03
2011	Natural Gas Uses for All Facilities	122,150	PG&E Natural Gas	Therms	12,215	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	667	5.460E-03
2012	Natural Gas Uses for All Facilities	145,948	PG&E Natural Gas	Therms	14,595	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	797	5.460E-03
2013	Natural Gas Uses for All Facilities	126,512	PG&E Natural Gas	Therms	12,651	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	691	5.460E-03
2014	Natural Gas Uses for All Facilities	104,610	PG&E Natural Gas	Therms	10,461	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	571	5.460E-03
2015	Natural Gas Uses for All Facilities	107,467	PG&E Natural Gas	Therms	10,747	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	587	5.460E-03
2016	Natural Gas Uses for All Facilities	103,731	PG&E Natural Gas	Therms	10,373	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	566	5.460E-03
2017	Natural Gas Uses for All Facilities	117,654	PG&E Natural Gas	Therms	11,765	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	642	5.460E-03
2018	Natural Gas Uses for All Facilities	144,003	PG&E Natural Gas	Therms	14,400	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	786	5.460E-03
2019	Natural Gas Uses for All Facilities	136,803	PG&E Natural Gas	Therms	13,680	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	747	5.460E-03
2020	Natural Gas Uses for All Facilities	140,585	PG&E Natural Gas	Therms	14,059	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	768	5.460E-03
2021	Natural Gas Uses for All Facilities	143,586	PG&E Natural Gas	Therms	14,359	5.31E-02	1.00E-06	1.00E-07	1	27	273	1.49E-03	784	5.460E-03

Forecast

Future emissions / year from existing buildings, MT CO2e, assuming average usage		
	BAU	**Leg-adjusted**
	Existing Buildings	Existing Buildings
2030	745	745
2045	745	745

Source:

Valley Water

ICLEI U.S. Communities Protocol Appendix C. Version 1.1 (2013)

ASSUMPTIONS

Years across which to average	
Start	2017
End	2021

ICLEI Upstream Emissions Factor for Natural Gas		
kg CO2e per 1000m3	4.45E-01	
kg CO2e per 1000 cubic feet	1.26E-02	
MMBTU per 1000 scf	1.04E+00	https://www.eia.gov/tools/faqs/faq.php?id=45&t=8
MT CO2e per MMBTU	1.21E-05	
Source: Method 5.1 ICLEI U.S. Communities Protocol Appendix C. Version 1.1 (2013)		

Methane Leakage Emission Factors	Percent of Methane	Source
pipeline	2.30%	Alvarez, Ramón et al. (2018). Assessment of methane emissions from the U.S. oil and gas supply chain. Science. 361. https://www.science.org/doi/abs/10.1126/science.aar7204.
end-use	0.50%	Environmental Defense Fund USER GUIDE FOR NATURAL GAS LEAKAGE RATE MODELING TOOL. Available at: https://www.edf.org/sites/default/files/US-Natural-Gas-Leakage-Model-User-Guide.pdf

Valley Water On-Road Fleet Gasoline Emissions

Inventory

Year	Emissions Sector	Fuel Type	Fuel Amount	Fuel Units	Notes	Gas emissions factor from EPA, MT CO2e/gallon	Total MT CO2e
2009	*Fleet-OnRoad*	*Gasoline*	*88,834*	*gallons*		*0.0088*	*783*
2010	*Fleet-OnRoad*	*Gasoline*	*91,533*	*gallons*		*0.0088*	*807*
2011	*Fleet-OnRoad*	*Gasoline*	*104,874*	*gallons*		*0.0088*	*924*
2012	*Fleet-OnRoad*	*Gasoline*	*120,412*	*gallons*		*0.0088*	*1,061*
2013	*Fleet-OnRoad*	*Gasoline*	*137,241*	*gallons*		*0.0088*	*1,209*
2014	*Fleet-OnRoad*	*Gasoline*	*108,579*	*gallons*	*data gap,5 year average used*	*0.0088*	*957*
2015	*Fleet-OnRoad*	*Gasoline*	*107,410*	*gallons*		*0.0088*	*947*
2016	*Fleet-OnRoad*	*Gasoline*	*98,338*	*gallons*		*0.0088*	*867*
2017	*Fleet-OnRoad*	*Gasoline*	*109,443*	*gallons*		*0.0088*	*964*
2018	*Fleet-OnRoad*	*Gasoline*	*117,064*	*gallons*		*0.0088*	*1,032*
2019	*Fleet-OnRoad*	*Gasoline*	*128,693*	*gallons*		*0.0088*	*1,134*
2020	*Fleet-OnRoad*	*Gasoline*	*132,957*	*gallons*		*0.0088*	*1,172*
2021	*Fleet-OnRoad*	*Gasoline*	*137,122*	*gallons*		*0.0088*	*1,208*

Source:

Valley Water

Forecast

	Historical Gallons / Year	BAU Future Gallons / Year	Leg-adjusted gallons per year	BAU emissions (MTCO2e)	Leg-adjusted emissions (MTCO2e)
2009	*88,834*				
2010	*91,533*				
2011	*104,874*				
2012	*120,412*				
2013	*137,241*				
2014	*108,579*				
2015	*107,410*				
2016	*98,338*				
2017	*109,443*				
2018	*117,064*				
2019	*128,693*				
2020	*132,957*				
2021	*137,122*				
2030		137,561	105,835	1,212	933
2045		156,320	6,595	1,378	58

Fleet Fuel Usage Data from Valley Water

Young / Chesonis pers. comm. 2024

	Year	Gasoline Usage (Gallons)	Diesel Usage (Gallons)	Natural Gas Usage (Therms)	HFC-134a ($MTCO_2e$)
	2009	88,834	48,888	134,658	111
	2010	91,533	37,031	138,852	123
	2011	104,874	43,430	122,150	28
	2012	120,412	16,075	145,948	56
	2013	137,241	57,538	126,512	0
	2014	108,579	40,592	104,610	0
	2015	107,410	52,729	107,467	0
	2016	98,338	62,779	103,731	0
	2017	109,443	81,564	117,654	0
	2018	117,064	52,907	144,003	0
	2019	128,693	66,349	136,803	0
	2020	132,957	71,929	140,585	0
	2021	137,122	58,446	143,586	0
	2017-2021 Average	125,056	66,239	136,526	24
Forecast as of July 2023	**2030**	**137,561**	**89,720**	**136,526**	**24**
	2045	**156,320**	**101,954**	**136,526**	**24**
	2030 vs. 5-Yr Average(% Change)	**10%**	**35%**	**0%**	**0%**
	2045 vs. 5-Yr Average(% Change)	**25%**	**54%**	**0%**	**0%**
Analysis	5-Yr Max	137,122	81,564	144,003	-
	5-Yr Min	109,443	52,907	117,654	-
	5-Yr Max vs. 5-Yr Min(% Change)	**25%**	**54%**	**22%**	**-**

Valley Water Electricity-related Emissions

Inventory

	Weighted Average Emissions Factor, lbs CO2e/MWh	PWRPA (MWh)	PG&E (MWh)	CCA (MWh)	Total MWh	Emissions (MT CO2e)
2009	442	17,023	776	0.00	17,799	3,568
2010	282	17,012	764	0.00	17,777	2,274
2011	70	16,278	832	0.00	17,109	545
2012	484	15,555	919	0.00	16,475	3,613
2013	590	16,483	798	0.00	17,281	4,627
2014	616	21,579	682	0.00	22,261	6,218
2015	607	22,619	154	0.00	22,773	6,274
2016	18.0	21,369	1,397	0.00	22,766	186
2017	12.4	23,275	1,456	0.00	24,732	139
2018	8.0	20,731	845	175.97	21,753	79
2019	5.2	22,973	0	186.78	23,159	55
2020	8.0	25,686	1,329	20.20	27,035	99
2021	4.6	22,124	1,094	0.00	23,218	49

Forecast

Year	Historical MWh at generator	Forecast MWh (BAU and leg-adjusted) [1]	BAU forecast emissions (MT CO2e)	Leg-adjusted emissions (MT CO2e) [2]
2009	*17,799*			
2010	*17,777*			
2011	*17,109*			
2012	*16,475*			
2013	*17,281*			
2014	*22,261*			
2015	*22,773*			
2016	*22,766*			
2017	*24,732*			
2018	*21,753*			
2019	*23,159*			
2020	*27,035*			
2021	*23,218*			
2022		27,035		
2023		27,035		
2024		27,035		
2025		27,035		
2026		27,035		
2027		27,035		
2028		27,035		
2029		27,035		
2030		27,035	94.78	93.16
2031		27,035		
2032		27,035		
2033		27,035		
2034		27,035		
2035		27,035		
2036		27,035		
2037		27,035		
2038		27,035		
2039		27,035		
2040		27,035		
2041		27,035		
2042		27,035		
2043		27,035		
2044		27,035		
2045		27,035	94.78	-

[1] Based on maximum of historical values

[2] The 2030 forecast assumes Valley Water continues to use the PWRPA zero-carbon portfolio: (https://www.energy.ca.gov/filebrowser/download/4662). This will only be slightly lower than the BAU case, because 96% of the power is from PWRPA which does not change between the BAU and Leg-adjusted scenario. Thus, 96 percent of the emissions keeps its current emissions factor of zero; the other 4 percent falls to 63% of its former emissions.

[3] The 2045 forecast assumes Valley Water continues to use the PWRPA zero-carbon portfolio: https://www.energy.ca.gov/filebrowser/download/4662

Weighted average emissions factor in baseline years, lbs CO2e/MWh

7.73

Interpolate leg-adjusted emissions factor for non-PWRPA power in 203C

PGE lbs CO2 / MWh

98		2021	
-		2045	SB100
59		2030	Interpolated
60%	2030 emissions factor as percent of 2021		SB100

96% Percent of power in baseline years that is from zero-carbon from PWRPA

4% Percent of power in baseline years that is from other sources

Valley Water Electricity-Related Emissions

Inventory

Year	Sector	Volume of Water Imported	Unit	Emissions factor, MT CO2e/acre-foot	MT CO2e
2010	*Imported Water -State Water Project*		AF	0.26	0
2011	*Imported Water -State Water Project*		AF	0.17	0
2012	*Imported Water -State Water Project*		AF	0.27	0
2013	*Imported Water -State Water Project*		AF	0.21	0
2014	*Imported Water -State Water Project*	23,750	AF	0.12	2,950
2015	*Imported Water -State Water Project*	54,304	AF	0.18	9,636
2016	*Imported Water -State Water Project*	71,271	AF	0.16	11,411
2017	*Imported Water -State Water Project*	32,795	AF	0.15	4,958
2018	*Imported Water -State Water Project*	59,018	AF	0.13	7,766
2019	*Imported Water -State Water Project*	18,986	AF	0.06	1,156
2020	*Imported Water -State Water Project*	31,684	AF	0.07	2,213
2021	*Imported Water -State Water Project*	39,502	AF	0.10	4,017
2012	*Imported Water -Central Valley Project*	122,857	AF	0.00	0
2013	*Imported Water -Central Valley Project*	102,515	AF	0.00	0
2014	*Imported Water -Central Valley Project*	65,661	AF	0.00	0
2015	*Imported Water -Central Valley Project*	43,682	AF	0.00	0
2016	*Imported Water -Central Valley Project*	64,085	AF	0.00	0
2017	*Imported Water -Central Valley Project*	80,046	AF	0.00	0
2018	*Imported Water -Central Valley Project*	108,805	AF	0.00	0
2019	*Imported Water -Central Valley Project*	79,526	AF	0.00	0
2020	*Imported Water -Central Valley Project*	92,865	AF	0.00	0
2021	*Imported Water -Central Valley Project*	87,924	AF	0.00	0

Source:

Valley Water

No data available for SWP prior to 2014.

Forecast Imported Water -State Water Project Imported Water -Central Valley Project

Acre-feet per year of imported water	Imported Water -State Water Project (Acre-feet per year)	Imported Water -Central Valley Project (Acre-feet per year)	Total imported water	BAU emissions forecast (MT CO2e)	Leg-adjusted Emissions Forecast (MT CO2e)
2010					
2011					
2012					
2013	-	102,515	102,515		
2014	23,750	65,661	89,411		
2015	54,304	43,682	97,986		
2016	71,271	64,085	135,356		
2017	32,795	80,046	112,841		
2018	59,018	108,805	167,823		
2019	18,986	79,526	98,512		
2020	31,684	92,865	124,549		
2021	39,502	87,924	127,426		
2022	36,284	89,555	125,839		
2023	36,470	90,014	126,484		
2024	36,656	90,473	127,129		
2025	36,842	90,932	127,775		
2026	37,028	91,391	128,420		
2027	37,214	91,850	129,065		
2028	37,400	92,309	129,710		
2029	37,586	92,769	130,355		
2030	37,772	93,228	131,000	4,174	1,372
2031	37,801	93,299	131,100		
2032	37,830	93,370	131,200		
2033	37,859	93,441	131,300		
2034	37,888	93,512	131,400		
2035	37,916	93,584	131,500		
2036	37,945	93,655	131,600		
2037	37,974	93,726	131,700		
2038	38,003	93,797	131,800		
2039	38,032	93,868	131,900		
2040	38,061	93,939	132,000		
2041	38,089	94,011	132,100		
2042	38,118	94,082	132,200		
2043	38,147	94,153	132,300		
2044	38,176	94,224	132,400		
2045	38,205	94,295	132,500	4,222	-

Acre-feet used for interpolation from water supply maters plan

2020	124,549
2030	131,000
2040	132,000

Source: Water Supply Master Plan 2040_11.01.2019_v2.pdf (valleywater.org)

Calculate shares from baseline period

Imported Water -State Water Project	Imported Water -Central Valley Project
29%	71%

Valley Water Employee Commute Emissions

Inventory

Year	Sector	Number of Employees	Percent of FTE Telecommuting	One-way commute length (miles) [1]	Type of Employees	Notes	Source	Working days per year	Round-trip commute length per day (miles)	Number of telecommuting FTE	Number of non-telecommuting FTE	Percent of workweek in office for telecommuters	Percent of week in office for non-telecommuters	Telecommuter VMT	Non-telecommuter VMT	Total VMT	MT CO2e/VMT	MT CO2e
2010	*Employee Commute*	747	10%	10	Full Time Regular			215	20	75	672	80%	100%	256,968	2,890,890	3,147,858	408	1,283
2011	*Employee Commute*	698	10%	10	Full Time Regular			215	20	70	628	80%	100%	240,112	2,701,260	2,941,372	402	1,183
2012	*Employee Commute*	697	10%	10	Full Time Regular			215	20	70	627	80%	100%	239,768	2,697,390	2,937,158	397	1,167
2013	*Employee Commute*	675	10%	10	Full Time Regular			215	20	68	608	80%	100%	232,200	2,612,250	2,844,450	387	1,102
2014	*Employee Commute*	665	10%	10	Full Time Regular			215	20	67	599	80%	100%	228,760	2,573,550	2,802,310	379	1,062
2015	*Employee Commute*	700	10%	10	Full Time Regular			215	20	70	630	80%	100%	240,800	2,709,000	2,949,800	371	1,095
2016	*Employee Commute*	727	10%	10	Full Time Regular			215	20	73	654	80%	100%	250,088	2,813,490	3,063,578	360	1,103
2017	*Employee Commute*	733	10%	10	Full Time Regular			215	20	73	660	80%	100%	252,152	2,836,710	3,088,862	355	1,096
2018	*Employee Commute*	647	10%	10	Full Time Regular			215	20	65	582	80%	100%	222,568	2,503,890	2,726,458	347	946
2019	*Employee Commute*	710	10%	10	Full Time Regular			215	20	71	639	80%	100%	244,240	2,747,700	2,991,940	340	1,018
2020	*Employee Commute*	793	60%	10	Full Time Regular			215	20	476	317	0%	100%	-	1,363,960	1,363,960	335	457
2021	*Employee Commute*	884	60%	10	Full Time Regular			215	20	530	354	0%	100%	-	1,520,480	1,520,480	328	498
2010	*Employee Commute*	77	0%	10	Temps	50% FTE assumed	153	215	20	0	77	80%	100%	-	328,950	328,950	408	134
2011	*Employee Commute*	76	0%	10	Temps	50% FTE assumed	151	215	20	0	76	80%	100%	-	324,650	324,650	402	131
2012	*Employee Commute*	89	0%	10	Temps	50% FTE assumed	177	215	20	0	89	80%	100%	-	380,550	380,550	397	151
2013	*Employee Commute*	137	0%	10	Temps	50% FTE assumed	274	215	20	0	137	80%	100%	-	589,100	589,100	387	228
2014	*Employee Commute*	142	0%	10	Temps	50% FTE assumed	284	215	20	0	142	80%	100%	-	610,600	610,600	379	231
2015	*Employee Commute*	163	0%	10	Temps	50% FTE assumed	326	215	20	0	163	80%	100%	-	700,900	700,900	371	260
2016	*Employee Commute*	167	0%	10	Temps	50% FTE assumed	334	215	20	0	167	80%	100%	-	718,100	718,100	360	259
2017	*Employee Commute*	142	0%	10	Temps	50% FTE assumed	283	215	20	0	142	80%	100%	-	608,450	608,450	355	216
2018	*Employee Commute*	145	0%	10	Temps	50% FTE assumed	289	215	20	0	145	80%	100%	-	621,350	621,350	347	216
2019	*Employee Commute*	113	0%	10	Temps	50% FTE assumed	226	215	20	0	113	80%	100%	-	485,900	485,900	340	165
2020	*Employee Commute*	55	100%	10	Temps	50% FTE assumed	109	215	20	55	0	0%	100%	-	-	-	335	-
2021	*Employee Commute*	99	100%	10	Temps	50% FTE assumed	197	215	20	99	0	0%	100%	-	-	-	328	-

Forecast

Year	Sector	Number of Employees	Percent of FTE Telecommuting	One-way commute length (miles) [1]	Type of Employees	Notes	Source	Working days per year	Round-trip commute length per day (miles)	Number of telecommuting FTE	Number of non-telecommuting FTE	Percent of workweek in office for telecommuters	Percent of week in office for non-telecommuters	Telecommuter VMT	Non-telecommuter VMT	Total VMT	g CO2e/VMT	MT CO2e
2030		753	60%	10	Full Time Regular			215	20	452	301	60%	100%	1,166,263	1,295,848	2,462,111	231	567.617
2030		110	60%	10	Temps			215	20	66	44	60%	100%	170,899	189,888	360,787	231	83.176
2045		753	60%	10	Full Time Regular			215	20	452	301	60%	100%	1,166,263	1,295,848	2,462,111	46	112.383
2045		110	60%	10	Temps			215	20	66	44	60%	100%	170,899	189,888	360,787	46	16.468

Source:

Valley Water

[1] 10 miles for one-way trip is from Figure 33 (Average trip distance for travel on work tours in 2050 across alternatives), page 25 of https://www.planbayarea.org/sites/default/files/documents/Plan_Bay_Area_2050_Forecasting_Modeling_Report_October_2021.pdf

Valley Water Business Travel Emissions

Inventory

YEAR [1]	Mode	Air Travel: Passenger-miles [2]	Gallons of fuel [3]	kg CO2e	MT CO2e	On-Road Vehicle Travel: Miles	Emissions per Mile (MTCO2e/VMT)	MT CO2e	Air + Vehicle Emissions (MT CO2e)
2018	Car					16,768	0.0003470	6	6
2018	Car					49,401	0.0003470	17	17
2018	Plane	281,431	5,249	43,767	44				44
2019	Car					35,451	0.0003403	12	12
2019	Car					188,598	0.0003403	64	64
2019	Plane	971,359	18,116	151,063	151				151

Note:

[1] 2020 -2021 data excluded due to COVID

[2] Calculated based on expenditure on air travel and an average airline revenue of $0.19 per mile.

[3] 51.4 passenger-miles per gross gallon equivalent From AFDC:https://afdc.energy.gov/data/10311

Forecast

YEAR	Mode	Leg-adjusted 2030 Air + Vehicle MTCO2e emissions (ACC2) [1]	Leg-adjusted 2045 Air + Vehicle MTCO2e emissions (ACC2) [1]
2018	Car	4	1
2018	Car	11	2
2018	Plane	44	44
2019	Car	8	2
2019	Car	43	9
2019	Plane	151	151

Note:

[1] Applies 2030 emission factors under ACC2 to proxy activity levels from 2018 and 2019

Calculate 2030 and 2045 leg-adjusted MT CO2e (using 2018 and 2019 data only)

	2030	2045
2018	59	47
2019	203	161
Average	131	104

Valley Water Sediment Hauling Emissions

Inventory

Calendar Year	Sector	Item Description	Landfilled Waste (tons)	Recycled Waste (tons)	Composted Waste (tons)	Total Waste (Tons)	Waste Utility	Notes	Total Waste CY	Recycled Waste (CY)	Landfilled Waste CY	Stream Maintenance Activities (landfilled, recycled, composted)	short tons to metric
2015	Healthy Community	Homeless Encampment removal	710									0	0
2016	Healthy Community	Homeless Encampment removal	878									0	0
2017	Healthy Community	Homeless Encampment removal	1,146									0	0
2018	Healthy Community	Homeless Encampment removal	971									0	0
2019	Healthy Community	Homeless Encampment removal	871									0	0
2020	Healthy Community	Homeless Encampment removal	219									0	0
2021	Healthy Community	Homeless Encampment removal	104									0	0
2015	Healthy Community	Good neighbor trash and debris	119									0	0
2016	Healthy Community	Good neighbor trash and debris	59									0	0
2017	Healthy Community	Good neighbor trash and debris	101									0	0
2018	Healthy Community	Good neighbor trash and debris	54									0	0
2019	Healthy Community	Good neighbor trash and debris	62									0	0
2020	Healthy Community	Good neighbor trash and debris	58									0	0
2021	Healthy Community	Good neighbor trash and debris	53									0	0
2018	Stream Maintenance	Vegetation Management			1,082							1,082	982
2019	Stream Maintenance	Vegetation Management			1,203							1,203	1,091
2020	Stream Maintenance	Vegetation Management			1,294							1,294	1,174
2021	Stream Maintenance	Vegetation Management			1,437							1,437	1,304
2018	Stream Maintenance	Sediment Management	14,843	7,270		22,113			19,279	6,338	12,941	22,113	20,061
2019	Stream Maintenance	Sediment Management	56,195	-		56,195			48,993	0	48,993	56,195	50,979
2020	Stream Maintenance	Sediment Management	53,418	10,674		64,092			55,878	9,306	46,572	64,092	58,143
2021	Stream Maintenance	Sediment Management	24,730	7,423		32,154			28,033	6,472	21,561	32,153	29,169
2019	CIP Sediment Reuse	Sediment Reuse from CIP		6,304						5,496		0	0

Source:
Valley Water

Sediment Hauling Calculations

Get Dump Truck Emissions and Trip Data from EMFAC [1]	2018	2019	2020	2021
Number of dump truck trips (one-way)	2,356,891	2,025,225	1,986,622	1,994,444
Dump Truck Emissions (MT CO2e)	24,466	24,519	24,678	24,514
Dump Truck VMT	13,425,728	13,472,910	13,604,790	13,503,264
Emissions per VMT (MT CO2e / VMT)	1.82E-03	1.82E-03	1.81E-03	1.82E-03

Line	Item	2018	2019	2020	2021	Calculation
A	Total metric tons of sediment hauled per year	21,042	52,071	59,317	30,472	Sediment management only values. Does not include Healthy Community items such as homeless encampment removals or trash/debris removal.
B	Metric tons of sediment hauled per load	15.8	15.8	15.8	15.8	Assuming a 5-Axle Truck-Trailer with a payload of 34,760 pounds. From Table III-4 on page III-9 of: https://www.fhwa.dot.gov/reports/tswstudy/vol2-chapter3.pdf
C	Loads hauled per year	1335	3303	3762	1933	Line A / Line B
D	grams CO2e per Dump Truck VMT	1,822	1,820	1,814	1,815	From CARB EMFAC data for Santa Clara, 2018-2021. Assumes T7 Single Dump Class 8 Heavy-Heavy Duty Single Unit Dump Truck (GVWR 33001 lbs. and over)
E	Truck miles traveled per load (round trip)	11.4	13.3	13.7	13.5	Uses EMFAC values to calculate miles / trip for dump trucks
F	Metric tons of CO2e per load	0.0208	0.0242	0.0248	0.0246	Line D * Line E / 10^6
G	Metric tons of CO2e per year - BAU	28	80	93	48	Line C * Line F

Forecasts

	2030	2045
Metric tons of CO2e per year - Leg-adjusted with advanced clean fleets	47.69	-

Source: [1] Based on the following vehicle class per https://ww2.arb.ca.gov/sites/default/files/2021-03/emfac2021_volume_3_technical_document.pdf
T7 Single Dump Class 8

Valley Water Wastewater and Solid Waste Emissions Calculations

Inventory and Forecast

Wastewater Emissions

	FTE historical	FTE future [1]	Methane from combustion of digester gas (MTCO2e) (WW.1.(Alt))	N2O from combustion of digester gas (MTCO2e) (WW.2.(Alt))	N2O emissions from nitrification/denitrification (MTCO2e) (WW.7)	N2O from effluent (discharged to river/estuary) (MTCO2e) (WW.12(Alt))	Total Wastewater Emissions (MT CO2e)
2010	824		0.02	0.03	1.97	6.18	8.20
2011	774		0.02	0.03	1.85	5.81	7.70
2012	786		0.02	0.03	1.88	5.90	7.82
2013	812		0.02	0.03	1.94	6.10	8.09
2014	807		0.02	0.03	1.93	6.06	8.04
2015	863		0.02	0.04	2.06	6.48	8.60
2016	894		0.02	0.04	2.14	6.71	8.90
2017	875		0.02	0.04	2.09	6.56	8.71
2018	792		0.02	0.03	1.89	5.94	7.88
2019	823		0.02	0.03	1.97	6.18	8.20
2020	848		0.02	0.04	2.02	6.36	8.44
2021	983		0.02	0.04	2.35	7.38	9.79
2030		863.8	0.020	0.036	2.063	6.484	8.60
2045		863.8	0.020	0.036	2.063	6.484	8.60

Source: Methods based on equations from ICLEI Community Protocol

Notes:

[1] Average of baseline years (2017-2021)

Solid Waste Emissions

Calculate Emissions from Solid Waste using ICLEI Protocols, Equation SW.4.1 Methane Emissions

CH4	(1 - CE)	(1 - OX)	M	EF	
29.8	0.25	0.9	0.679185	0.06	

	Total Solid Waste Emissions (MT CO2e)
2010	225
2011	211
2012	215
2013	222
2014	221
2015	236
2016	244
2017	239
2018	216
2019	225
2020	232
2021	268
2030	236
2045	236

Valley Water Construction Emissions

Project Data from Valley Water

Includes employee construction working commute, materials, painting, energy consumption from grid for construction. This is direct emissions only, NOT consumption based, not embodied energy.

Start Year	End Year	Sector	Project Name	Total Project Emissions (MTCO2e)	Notes
2010	2011	*Construction*	South Bay Advanced Recycled Water Treatment Facility	1,235	
2011	2011	*Construction*	Lower Berryessa Creek Program	4,531	
2022	2023	*Construction*	Rinconada Water Treatment Plant Residuals Management Projct	12,530	
2015	2027	*Construction*	Rinconada Water Treatment Plant: RELIABILITY IMPROVEMENT PROJECT	1,118	Some phases completed and some ongoing
2013	2014	*Construction*	Kirk Diversion Dam Replacement and Fish Screen Project	123	
2014	2018	*Construction*	Upper Guadalupe River Flood Control Project- Reach 12	258	
2014	2014	*Construction*	Coyote Ridge Long Term Management Plan	72	
2015	2015	*Construction*	Upper Penitencia Creek Property Acquisition and Long Term Management Plan	17	
2015	2023	*Construction*	South County Recycled Water Master Plan Project	468	
2015	2017	*Construction*	Coyote Warehouse Project	428	
2016	2018	*Construction*	Upper Berryessa Creek Flood Risk Management Project	1,849	
2016	2017	*Construction*	Penitencia Delivery Main and Penitencia Force Main Seismic Retrofit Project	87	
2016	2016	*Construction*	Penitencia and Santa Teresa Water Treatment Plants Solar Project	60	
2017	2020	*Construction*	Upper Guadalupe Reach 6 Aquatic Habitat Improvement Project	421	
2017	2021	*Construction*	Permanente Creek Flood Protection Project	4,206	
2018	2019	*Construction*	Uvas Creek Levee Rehabilitation Project	235	
2018	2019	*Construction*	Main Avenue and Madrone Pipeline Restoration Project	1,021	
2018	2019	*Construction*	Cunningham Flood Detention Facility Certification Project	681	
2019	2025	*Construction*	Upper Llagas Creek Flood Protection Project	14,962	
2020	2022	*Construction*	Saratoga Creek Hazard Tree Removal and Restoration Project	266	
2022	2023	*Construction*	Calabazas Creek Bank Rehabilitation Project	345	Project anticipated to finish fall 2023
2024	2034	*Construction*	Palo Alto Flood Basin Tide Gate Structure Replacement Project	1,769	On hold per latest CIP. Include in forecast within first 10 years.
2024	2034	*Construction*	Almaden Lake Improvement Projct	5,949	On hold per latest CIP. Incude in forecast within first 10 years.
2027	2035	*Construction*	Pacheco Reservoir Expansion Project	-	Data from EIR. Mitigated to zero. Do not include. GHGRP to provide offset mechanism.
2026	2040	*Construction*	Anderson Dam Siesmic Retrofit Project	-	Data from EIR (Sept 2023). Mitigated to zero. Do not include. CAP to provide offset mechanism.
2024	2034	*Construction*	Sunnyvale East and West Channels Flood Protection Project	1,756	On hold per latest CIP. Incude in forecast within first 10 years.
2022	2028	*Construction*	South San Francisco Bay Shoreline	15,769	
2012	2045	*Construction*	Stream Maintenance Program (Second: 2012-2022)	133,188	2012 estimate: 4363.2 MTCO2/year; 2020 estimate 3917.3 MTCO2/year. Includes VW vehicles and equipment. Reduction assumes effect of LCFS. SMP emissions ongoing annually.
2031	2045	*Construction*	Forecasted Projects (2034 to 2045) (BAU)	51,146	Annual average of non-pacheco/ADSRP/stream maintenance projects between 2010 and 2030.
2031	2045	*Construction*	Forecasted Projects (2034 to 2045) (Leg-Adj BAU)		Annual average of non-pacheo/ADSRP projects between 2010 and 2030. Assumes that 30% of emissions are from light duty and heavy duty on-road transportation (50% employee commute and 50% haul trucks). For light duty vehicles, the forecast applies a 30% reduction to on-road transportation based on difference between 2021 (mean year) and 2030 LDV in Santa Clara County, and an 87% reduction by 2045, using data from EMFAC and ACC2. For heavy-duty vehicles, we estimate a 16% reduction by 2030 and 40% reduction by 2045 from 2021. No leg reduction are expected to apply to GHG emissions from off-road vehicles.

Source:
Valley Water

Valley Water Construction Emissions

		Inventory and Forecast	Emissions assigned to year, $MTCO_2e$														
Total Years	emissions/year	Project Name	2010	2011	2012	2013	2014	2015	2016	**2017**	**2018**	**2019**	**2020**	**2021**	2022	2023	2024
2	617.50	South Bay Advanced Recycled Water Treatment Facility	618	618	-	-	-	-	-	-	-	-	-	-	-	-	-
1	4,531.24	Lower Berryessa Creek Program	-	4,531	-	-	-	-	-	-	-	-	-	-	-	-	-
2	6,265.00	Rinconada Water Treatment Plant Residuals Management Projct	-	-	-	-	-	-	-	-	-	-	-	-	6,265	6,265	-
13	86.00	Rinconada Water Treatment Plant: RELIABILITY IMPROVEMENT PROJECT	-	-	-	-	-	86	86	86	86	86	86	86	86	86	86
2	61.43	Kirk Diversion Dam Replacement and Fish Screen Project	-	-	-	61	61	-	-	-	-	-	-	-	-	-	-
5	51.60	Upper Guadalupe River Flood Control Project- Reach 12	-	-	-	-	52	52	52	52	52	-	-	-	-	-	-
1	71.74	Coyote Ridge Long Term Management Plan	-	-	-	-	72	-	-	-	-	-	-	-	-	-	-
1	16.80	Upper Penitencia Creek Property Acquisition and Long Term Management Plan	-	-	-	-	-	17	-	-	-	-	-	-	-	-	-
9	52.01	South County Recycled Water Master Plan Project	-	-	-	-	-	52	52	52	52	52	52	52	52	52	-
3	142.79	Coyote Warehouse Project	-	-	-	-	-	143	143	143	-	-	-	-	-	-	-
3	616.27	Upper Berryessa Creek Flood Risk Management Project	-	-	-	-	-	-	616	616	616	-	-	-	-	-	-
2	43.50	Penitencia Delivery Main and Penitencia Force Main Seismic Retrofit Project	-	-	-	-	-	-	44	44	-	-	-	-	-	-	-
1	60.00	Penitencia and Santa Teresa Water Treatment Plants Solar Project	-	-	-	-	-	-	60	-	-	-	-	-	-	-	-
4	105.30	Upper Guadalupe Reach 6 Aquatic Habitat Improvement Project	-	-	-	-	-	-	-	105	105	105	105	-	-	-	-
5	841.20	Permanente Creek Flood Protection Project	-	-	-	-	-	-	-	841	841	841	841	841	-	-	-
2	117.51	Uvas Creek Levee Rehabilitation Project	-	-	-	-	-	-	-	-	118	118	-	-	-	-	-
2	510.50	Main Avenue and Madrone Pipeline Restoration Project	-	-	-	-	-	-	-	-	511	511	-	-	-	-	-
2	340.56	Cunningham Flood Detention Facility Certification Project	-	-	-	-	-	-	-	-	341	341	-	-	-	-	-
7	2,137.43	Upper Llagas Creek Flood Protection Project	-	-	-	-	-	-	-	-	-	2,137	2,137	2,137	2,137	2,137	2,137
3	88.60	Saratoga Creek Hazard Tree Removal and Restoration Project	-	-	-	-	-	-	-	-	-	-	89	89	89	-	-
2	172.50	Calabazas Creek Bank Rehabilitation Project	-	-	-	-	-	-	-	-	-	-	-	-	173	173	-
11	160.82	Palo Alto Flood Basin Tide Gate Structure Replacement Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161
11	540.82	Almaden Lake Improvement Projct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	541
[redacted]																	
11	159.59	Sunnyvale East and West Channels Flood Protection Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160
7	2,252.68	South San Francisco Bay Shoreline	-	-	-	-	-	-	-	-	-	-	-	-	2,253	2,253	2,253
34	3,917.30	Stream Maintenance Program (Second: 2012-2022)	-	-	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917
		Forecasted Projects (2034 to 2045) (BAU)															
		Forecasted Projects (2034 to 2045) (Leg-Adj BAU)															
		BAU TOTAL FORECAST	618	5,149	3,917	3,979	4,102	4,266	4,969	5,856	6,638	8,108	7,228	7,123	14,972	14,883	9,255
		Leg-Adjusted TOTAL FORECAST															

ion Emissions

Valley Water Construction Emissions

Inventory and Forecast

Emissions assigned to year, MTCO2e

Project Name	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
South Bay Advanced Recycled Water Treatment Facility	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lower Berryessa Creek Program	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rinconada Water Treatment Plant Residuals Management Projct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rinconada Water Treatment Plant: RELIABILITY IMPROVEMENT PROJECT	86	86	86	-	-	-	-	-	-	-	-	-	-	-	-	-
Kirk Diversion Dam Replacement and Fish Screen Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Guadalupe River Flood Control Project- Reach 12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coyote Ridge Long Term Management Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Penitencia Creek Property Acquisition and Long Term Management Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South County Recycled Water Master Plan Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coyote Warehouse Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Berryessa Creek Flood Risk Management Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Penitencia Delivery Main and Penitencia Force Main Seismic Retrofit Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Penitencia and Santa Teresa Water Treatment Plants Solar Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Guadalupe Reach 6 Aquatic Habitat Improvement Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Permanente Creek Flood Protection Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uvas Creek Levee Rehabilitation Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Main Avenue and Madrone Pipeline Restoration Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cunningham Flood Detention Facility Certification Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Llagas Creek Flood Protection Project	2,137	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saratoga Creek Hazard Tree Removal and Restoration Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calabazas Creek Bank Rehabilitation Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palo Alto Flood Basin Tide Gate Structure Replacement Project	161	161	161	161	161	161	161	161	161	161	-	-	-	-	-	-
Almaden Lake Improvement Projct	541	541	541	541	541	541	541	541	541	541	-	-	-	-	-	-
[redacted]																
Sunnyvale East and West Channels Flood Protection Project	160	160	160	160	160	160	160	160	160	160	-	-	-	-	-	-
South San Francisco Bay Shoreline	2,253	2,253	2,253	2,253	-	-	-	-	-	-	-	-	-	-	-	-
Stream Maintenance Program (Second: 2012-2022)	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917	3,917
Forecasted Projects (2034 to 2045) (BAU)						2,605	2,605	2,605	2,605	2,605	3,466	3,466	3,466	3,466	3,466	3,466
Forecasted Projects (2034 to 2045) (Leg-Adj BAU)																
BAU TOTAL FORECAST	9,255	7,117	7,117	7,031	4,779	8,115	8,115	8,115	8,115	8,115	8,115	8,115	8,115	8,115	8,115	8,115
Leg-Adjusted TOTAL FORECAST						7,408										

ion Emissions

Valley Water Construction Emissions

Inventory and Forecast | **Emissions assigned to year, MTCO2e**

Project Name	2041	2042	2043	2044	2045
South Bay Advanced Recycled Water Treatment Facility	-	-	-	-	-
Lower Berryessa Creek Program	-	-	-	-	-
Rinconada Water Treatment Plant Residuals Management Projct	-	-	-	-	-
Rinconada Water Treatment Plant: RELIABILITY IMPROVEMENT PROJECT	-	-	-	-	-
Kirk Diversion Dam Replacement and Fish Screen Project	-	-	-	-	-
Upper Guadalupe River Flood Control Project- Reach 12	-	-	-	-	-
Coyote Ridge Long Term Management Plan	-	-	-	-	-
Upper Penitencia Creek Property Acquisition and Long Term Management Plan	-	-	-	-	-
South County Recycled Water Master Plan Project	-	-	-	-	-
Coyote Warehouse Project	-	-	-	-	-
Upper Berryessa Creek Flood Risk Management Project	-	-	-	-	-
Penitencia Delivery Main and Penitencia Force Main Seismic Retrofit Project	-	-	-	-	-
Penitencia and Santa Teresa Water Treatment Plants Solar Project	-	-	-	-	-
Upper Guadalupe Reach 6 Aquatic Habitat Improvement Project	-	-	-	-	-
Permanente Creek Flood Protection Project	-	-	-	-	-
Uvas Creek Levee Rehabilitation Project	-	-	-	-	-
Main Avenue and Madrone Pipeline Restoration Project	-	-	-	-	-
Cunningham Flood Detention Facility Certification Project	-	-	-	-	-
Upper Llagas Creek Flood Protection Project	-	-	-	-	-
Saratoga Creek Hazard Tree Removal and Restoration Project	-	-	-	-	-
Calabazas Creek Bank Rehabilitation Project	-	-	-	-	-
Palo Alto Flood Basin Tide Gate Structure Replacement Project	-	-	-	-	-
Almaden Lake Improvement Projct	-	-	-	-	-
[redacted]					
Sunnyvale East and West Channels Flood Protection Project	-	-	-	-	-
South San Francisco Bay Shoreline	-	-	-	-	-
Stream Maintenance Program (Second: 2012-2022)	3,917	3,917	3,917	3,917	3,917
Forecasted Projects (2034 to 2045) (BAU)	3,466	3,466	3,466	3,466	3,466
Forecasted Projects (2034 to 2045) (Leg-Adj BAU)					
BAU TOTAL FORECAST	8,115	8,115	8,115	8,115	8,115
Leg-Adjusted TOTAL FORECAST					5,629

ACC2 and Advanced Clean Fleet Legislative Adjustment Calculations

ACC2 and ACF adjustments

						g / vmt CO2e BAU			**g / vmt CO2e after legislative adjustments**					
ACF Group	EMFAC type	Definition	Legislative Adjustment	VMT/year [1]	EMFAC type	2019	2030	2045	2019	2030	2045	2019	2030	2045
N/A	LDA	Passenger Cars	ACC2	84,162	LDA	292	292	292	292	182	23	0%	-37%	-92%
N/A	LDT1	Light-Duty Trucks	ACC2	322,623	LDT1	366	366	366	366	287	85	0%	-22%	-77%
Group 1	LDT2	Light-Duty Trucks	ACC2	38,066	LDT2	392	392	392	392	286	84	0%	-27%	-79%
Group 1	MDV	Medium-Duty Trucks	ACF	364,731	MDV	475	475	475	475	356	-	0%	-25%	-100%
Group 2	LHD1	Light-Heavy-Duty Trucks	ACF	236,839	LHD1	887	887	887	887	666	-	0%	-25%	-100%
Group 2	LHD2	Light-Heavy-Duty Trucks	ACF	143,706	LHD2	930	930	930	930	697	-	0%	-25%	-100%
Group 3	T6TS	Medium-Heavy Duty Trucks	ACF	49,324	T6TS	1,943	1,943	1,943	1,943	1,749	-	0%	-10%	-100%
	Fleetwide			1,239,451	Fleetwide	622	622	622	622	478	26	0%	-23%	-96%
		Medium-Heavy Duty Trucks (for comparison)	ACF	-	T6's and T7's	1,715	1,715	1,715	1,715	1,316	-	0%	-23%	-100%

[1] Based on 2017-2021 Average VMT across Valley Water fleet

FLEETWIDE leg-adjusted emissions factor due to ACC2 and ACF, percent relative to BAU

2030	2045	
76.9%	4.2%	<---- all onroad vehicles
75%	10%	<---- light-duty only (for employee commute in construction calcs)
78%	0.0%	<---- heavy duty only

Table 1: High Priority and Federal Fleet ZEV ~~Phase-In~~ Milestone Schedule

Group	Percentage of Fleet that Must be ZEVs	10%	25%	50%	75%	100%
1	Box trucks, vans, two-axle buses, yard trucks, light-duty delivery vehicles	2025	2028	2031	2033	2035
2	Work trucks, day cab tractors, three-axle buses	2027	2030	2033	2036	2039
3	Sleeper cab tractors and specialty vehicles	2030	2033	2036	2039	2042

Advanced Clean Fleets - (Schedule Based on EV replacement Schedule across Groups 2 through 3)

	% of fleet electric (Group 1)	% of fleet electric (Group 2)	% of fleet electric (Group 3)	% of fleet electric (weighted by VMT per group)	% of fleet ICE (Group 1)	% of fleet ICE (Group 2)	% of fleet ICE (Group 3)	% of fleet ICE
2019	0%	0%	0%	0%	100%	100%	100%	100%
2022	0%	0%	0%	0%	100%	100%	100%	100%
2023	0%	0%	0%	0%	100%	100%	100%	100%
2024	0%	0%	0%	0%	100%	100%	100%	100%
2025	10%	0%	0%	0%	90%	100%	100%	100%
2026	10%	0%	0%	0%	90%	100%	100%	100%
2027	10%	10%	0%	9%	90%	90%	100%	91%
2028	25%	10%	0%	9%	75%	90%	100%	91%
2029	25%	10%	0%	9%	75%	90%	100%	91%
2030	25%	25%	10%	23%	75%	75%	90%	77%
2031	50%	25%	10%	23%	50%	75%	90%	77%
2032	50%	25%	10%	23%	50%	75%	90%	77%
2033	75%	50%	25%	47%	25%	50%	75%	53%
2034	75%	50%	25%	47%	25%	50%	75%	53%
2035	100%	50%	25%	47%	0%	50%	75%	53%
2036	100%	75%	50%	72%	0%	25%	50%	28%
2037	100%	75%	50%	72%	0%	25%	50%	28%
2038	100%	75%	50%	72%	0%	25%	50%	28%
2039	100%	100%	75%	97%	0%	0%	25%	3%
2040	100%	100%	75%	97%	0%	0%	25%	3%
2041	100%	100%	75%	97%	0%	0%	25%	3%
2042	100%	100%	100%	100%	0%	0%	0%	0%
2043	100%	100%	100%	100%	0%	0%	0%	0%
2044	100%	100%	100%	100%	0%	0%	0%	0%
2045	100%	100%	100%	100%	0%	0%	0%	0%
2046	100%	100%	100%	100%	0%	0%	0%	0%
2047	100%	100%	100%	100%	0%	0%	0%	0%
2048	100%	100%	100%	100%	0%	0%	0%	0%
2049	100%	100%	100%	100%	0%	0%	0%	0%
2050	100%	100%	100%	100%	0%	0%	0%	0%

Calculation of Electric Power Sector Emission Factors

Year	MWh	Metric Tons of CO2	Metric tons of CO2 per MWh	Metric tons of CO2 per acre-foot	Source for MWh and MT CO2
2010	7,017,918.90	1,740,305.63	0.25	0.26	2010 EPS report
2011	8,321,228.22	1,345,189.43	0.16	0.17	2011 EPS report
2012	7,170,510.35	1,794,499.73	0.25	0.27	2012 EPS report
2013	5,587,987.89	1,095,957.88	0.20	0.21	2013 EPS report
2014	2,796,292.10	326,431.64	0.12	0.12	2014 EPS report
2015	3,490,064.92	582,025.85	0.17	0.18	2015 EPS report
2016	6,540,308.49	984,190.13	0.15	0.16	2016 EPS report
2017	9,580,258.80	1,361,134.22	0.14	0.15	2017 EPS report
2018	5,624,903.20	695,680.59	0.12	0.13	2018 EPS report
2019	7,555,491.13	432,486.51	0.06	0.06	2019 EPS report
2020	3,818,321.11	250,688.04	0.07	0.07	2020 EPS report
2021	2,699,048.86	257,933.44	0.10	0.10	2021 EPS report

EPS reports overview: https://theclimateregistry.org/registries-resources/protocols/

Energy Intensity of Imported Water

1.064 < - MWh per acre foot of water delivered by SWP to Santa Clara Valley Water District

Source:

https://dwr.maps.arcgis.com/apps/Styler/index.html?appid=c112a21431884158b58fc5564e66c439

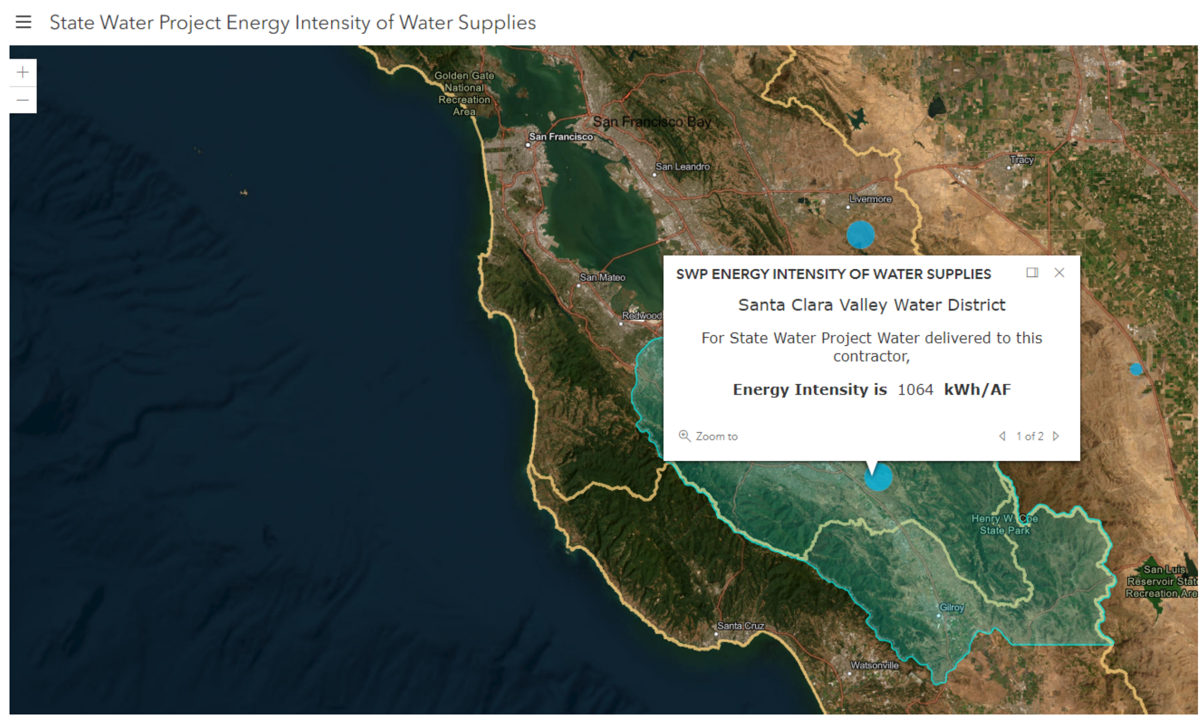


Table 3-20: Average Passenger Revenue per Passenger-Mile (current cents) from Bureau of Transportation Statistics

	1960	1965	1970	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Air carrier, domestic, scheduled service	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**17.7**	**16.6**	**16.9**	**15.9**	**16.5**	**17.0**	**17.2**	**17.8**
Index (1993 = 100)	NA	NA	NA	NA	NA	NA	NA	NA	NA	100	94	95	90	93	96	97	100
Commuter rail	**N**	**N**	**N**	**N**	**N**	**N**	**13.4**	**13.0**	**13.3**	**14.3**	**13.5**	**13.1**	**13.7**	**14.7**	**14.4**	**14.9**	**14.6**
Index (1993 = 100)	NA	NA	NA	NA	NA	NA	94	91	92	100	94	91	96	102	101	104	102
Intercity / Amtrak[a]	**3.0**	**3.1**	**4.0**	**6.4**	**8.0**	**11.3**	**14.1**	**14.1**	**14.1**	**14.0**	**13.7**	**14.6**	**16.6**	**17.3**	**17.5**	**18.4**	**23.2**
Index (1993 = 100)	22	22	29	46	57	80	101	101	100	100	98	104	118	123	125	131	165
Consumer Price Index (1993 = 100)	**20**	**22**	**27**	**37**	**57**	**74**	**90**	**94**	**97**	**100**	**103**	**105**	**109**	**111**	**113**	**115**	**119**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Air carrier, domestic, scheduled service	**16.2**	**15.3**	**15.2**	**14.6**	**14.9**	**16.2**	**16.2**	**17.5**	**16.0**	**17.2**	**18.4**	**18.9**	**19.3**	**19.9**	**19.2**	**18.3**	**18.3**	**18.5**	**18.6**	**15.3**	**15.6**
Index (1993 = 100)	92	87	86	83	85	92	92	99	91	97	104	107	109	113	109	104	104	105	105	86	88
Commuter rail	**15.1**	**15.2**	**15.5**	**16.6**	**18.3**	**18.0**	**17.8**	**19.6**	**19.6**	**20.7**	**21.5**	**22.9**	**22.9**	**24.3**	**25.5**	**26.3**	**26.1**	**25.7**	**26.0**	**27.6**	**25.2**
Index (1993 = 100)	105	106	108	116	127	125	124	137	136	144	150	160	160	170	178	184	182	179	181	193	176
Intercity / Amtrak[a]	**24.9**	**26.8**	**25.0**	**26.0**	**27.2**	**29.7**	**30.7**	**31.8**	**30.8**	**31.0**	**33.0**	**33.9**	**35.4**	**38.0**	**37.5**	**38.4**	**39.2**	**40.7**	**41.7**	**50.0**	**42.4**
Index (1993 = 100)	177	191	178	185	194	212	219	227	219	221	235	241	253	271	267	274	279	290	297	356	302
Consumer Price Index (1993 = 100)	**123**	**124**	**127**	**131**	**135**	**140**	**143**	**149**	**148**	**151**	**156**	**159**	**161**	**164**	**164**	**166**	**170**	**174**	**177**	**179**	**188**

KEY: N = data do not exist; NA = not applicable.

[a] *Amtrak* began operations in 1971.

NOTES

The Bureau of Transportation Statistics rebased the consumer price index from 1982-84 = 100 to 1993 = 100.
Air carrier data source changed for data from 1993 onward. Improved estimates are not comparable to data in versions before 2021.

SOURCES

Air carrier, domestic, scheduled service:

U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *TranStats Database,* Origin and Destination Survey, available at https://www.transtats.bts.gov/homepage.asp as of Nov. 9, 2022.

Commuter rail:

1990-2001: American Public Transportation Association, *Public Transportation Fact Book* (Washington, DC: 2011), tables 3 and 92 and similar tables in previous editions (passenger fares / passenger miles).

2002-21: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database*, Annual Database Service and Annual Database Fare Revenue (Washington, D.C.: Annual reports), available at https://www.transit.dot.gov/ntd/ntd-data as of Nov. 9, 2022.

Intercity / Amtrak:

1960-70: Association of American Railroads, *Railroad Facts* (Washington, DC: Annual Issues).

1975-80: Amtrak, personal communication, June 22, 2011.

1985-2002: Amtrak, *Amtrak Annual Report, Statistical Appendix* (Washington, DC: Annual Issues) (transportation revenues / passenger-miles).

2003-21: Association of American Railroads, *Railroad Facts* (Washington, DC: Annual Issues), p. 73 and similar pages in previous editions (passenger revenue/revenue passenger miles).

Consumer Price Index:

U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Price Index-Urban, U.S. All Items Indexes*, available at http://www.bls.gov/cpi/ as of Feb. 7, 2023.

Source:
https://www.bts.gov/content/average-passenger-revenue-passenger-mile

California Electricity Grid Line Losses

Year	eGRID CAMX T&D Line Loss	Source
2009	8.21%	Western only (Year 2009 Summary Tables. eGRID2012 Version 1.0)
2010	6.84%	Western only (Year 2010 Summary Tables. eGRID 9th edition Version 1.0)
2011	5.76%	Western only (eGRID 2012 Summary Tables) - 2011 not available
2012	5.76%	Western only (eGRID 2012 Summary Tables)
2013	4.79%	Western only (eGRID 2014 Summary Tables) - 2013 not available
2014	4.79%	Western only (eGRID 2014 Summary Tables)
2015	4.23%	eGRID 2016 Summary Tables - 2015 not available
2016	4.23%	eGRID 2016 Summary Tables
2017	4.80%	https://www.epa.gov/sites/default/files/2020-01/documents/egrid2018_summary_tables.pdf - 2017 not available
2018	4.80%	https://www.epa.gov/sites/default/files/2020-01/documents/egrid2018_summary_tables.pdf
2019	5.10%	https://www.epa.gov/sites/default/files/2021-02/documents/egrid2019_summary_tables.pdf
2020	5.30%	https://www.epa.gov/system/files/documents/2022-01/egrid2020_summary_tables.pdf
2021	4.40%	https://www.epa.gov/system/files/documents/2023-01/eGRID2021_summary_tables.pdf
2022	5.10%	https://www.epa.gov/system/files/documents/2024-01/egrid2022_summary_tables.pdf
2023	4.10%	https://www.epa.gov/system/files/documents/2025-01/egrid2023_summary_tables_rev1.pdf

Carbon Budget Calculations - Comparison of Annual Emissions, Measure Reductions, and Targets (MTCO2e)

Annual Reductions by Measure

	VF-1	OF-1	HG-1	FE-1	EC-1	SW-1	CN-1	CN-2	WA-1
2025	0	0	0	0	0	0	0	0	0
2030	145	904	41	224	13	157	939	149	301
2045	58	1082	41	567	5	197	3851	40	0

See CS-1 Reductions on separate page (CS-1 tab)

Cumulative Reductions by Measure

	Targets	Anthropogenic Targets	Leg-adjusted emissions	VF-1	OF-1	HG-1	FE-1	EC-1	SW-1	CN-1	CN-2	WA-1	Total annual reductions	Total cumulative reductions	Annual Emissions after measures	Targets met / shortfall (one year method)	Percent reduction below baseline without CS-1
2019	15,399	15,399	15,399														
2020	14,797	14,890	15,150														
2021	14,195	14,381	14,901														
2022	13,593	13,871	14,651														
2023	12,991	13,362	14,402														
2024	12,389	12,853	14,152														
2025	11,787	12,343	13,903	0	0	0	0	0	0	0	0	0	0	0	13,903	2,116	
2026	11,185	11,834	13,654	29	181	8	45	3	31	188	30	254	768	768	12,886	1,700	
2027	10,584	11,324	13,404	58	362	16	89	5	63	376	59	272	1,301	2,069	12,104	1,520	
2028	9,982	10,815	13,155	87	543	24	134	8	94	564	89	286	1,829	3,898	11,326	1,344	
2029	9,380	10,306	12,906	116	724	33	179	10	126	751	119	296	2,353	6,252	10,552	1,173	
2030	8,778	9,796	12,656	145	904	41	224	13	157	939	149	301	2873	9125	9,783	1,006	36%
2031	8,192	9,287	12,351	139	916	41	246	12	160	1,133	141	297	3,087	12,212	9,264	1,071	
2032	7,607	8,778	12,045	133	928	41	269	12	163	1,328	134	291	3,299	15,510	8,746	1,139	
2033	7,022	8,268	11,739	127	940	41	292	11	165	1,522	127	283	3,508	19,018	8,231	1,209	
2034	6,437	7,759	11,434	122	952	41	315	11	168	1,716	120	272	3,715	22,734	7,719	1,282	
2035	5,852	7,250	11,128	116	964	41	338	10	170	1,910	112	259	3,920	26,653	7,208	1,356	
2036	5,267	6,740	10,822	110	975	41	361	10	173	2,104	105	243	4,122	30,776	6,700	1,434	
2037	4,681	6,231	10,517	104	987	41	384	9	176	2,298	98	225	4,322	35,098	6,194	1,513	
2038	4,096	5,721	10,211	99	999	41	407	9	178	2,492	91	205	4,520	39,618	5,691	1,595	
2039	3,511	5,212	9,905	93	1,011	41	429	8	181	2,686	83	183	4,716	44,334	5,190	1,679	
2040	2,926	4,703	9,600	87	1,023	41	452	8	184	2,880	76	158	4,909	49,243	4,691	1,765	
2041	2,341	4,193	9,294	81	1,035	41	475	7	186	3,075	69	131	5,100	54,342	4,194	1,854	
2042	1,756	3,684	8,988	75	1,046	41	498	7	189	3,269	62	102	5,288	59,631	3,700	1,945	
2043	1,170	3,175	8,683	70	1,058	41	521	6	191	3,463	54	70	5,475	65,105	3,208	2,038	
2044	585	2,665	8,377	64	1,070	41	544	6	194	3,657	47	36	5,658	70,764	2,719	2,133	
2045	0	2,156	8,071	58	1,082	41	567	5	197	3,851	40	0	5,840	76,604	2,231	2,231	86%
	Cumulative Reductions (2025-2030) (MTCO2e)			**434**	**2,713**	**122**	**671**	**39**	**472**	**2,818**	**446**	**1,409**					
	Cumulative Reductions (2025-2045) (MTCO2e)			**1,912**	**17,700**	**734**	**6,769**	**171**	**3,147**	**40,201**	**1,805**	**4,164**					

	Scope 1 Reductions	Scope 3 Reductions (w/CS-1)	Total	Difference from Leg-Adjusted Forecast
Cumulative Reductions (2025-2030) (MTCO2e)	3,941	5,363	9,304	70,374
Cumulative Reductions (2025-2045) (MTCO2e)	27,115	109,552	136,666	96,178

	Without Measures	With All Measures Except CS-1	With All Measures (with CS-1)
Total carbon budget, 2025-2030	61,695	61,695	61,695
Total emissions 2025-2030	79,678	70,554	70,374
Budget surplus (+) shortfall (-)	-17,983	-8,858	-8,679

Targets and Gap

	Legislative-Adjusted Forecasted Emissions	Targets	Gap	Percent reduction from baseline	Start Year for carbon budget
2017-2021 Baseline	15,399	15,399	0		2019
2030	12,656	8,778	-3,879	43%	2030
2045	8,071	0	-8,071	100%	2045

Total carbon budget, 2025-2045	123,138	123,138	123,138
Total emissions 2025-2045	232,844	156,240	96,178
Budget surplus (+) shortfall (-)	-109,706	-33,102	26,961

CN-1

For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel, biodiesel, hydrogen) instead of conventional diesel in 17% of offroad construction equipment fuel use in equipment greater than 25 hp by 2030, and 70% by 2045 regardless of the engine Tier.

	Annual Reductions	
	2030	**2045**
Forecasted offroad construction emissions (MT CO2e)	5,566	5,501
Percent of offroad construction equipment fuel use from renewable diesel, biodiesel, electricity, or hydrogen [1]	17%	70%
Total GHG Reductions (MT CO2e)	939	3,851

Source:

[1] Renewable diesel and biodiesel are biogenic fuels, and emissions from their combustion are not counted towards Valley Water's total emissions. This is consistent with the California Air Resource Board's emissions counting conventions, which do not include biogenic CO2 in comparing emissions to State targets. See: California Air Resources Board. 2022. California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators. Available: https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf (at 12-13).

CN-2

For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel, biodiesel, hydrogen) instead of conventional fuel in 35% of onroad construction vehicle fuel use by 2030, and 100% by 2045.

	Annual Reductions	
	2030	**2045**
Legislative-adjusted onroad construction emissions (MT CO2e)	958	40
Estimated percent of onroad construction vehicle fuel use that is zero-emissions, based on decline in emissions factors due to ACF and ACC2. [1]	23%	96%
Estimated percent of onroad construction vehicle fuel use from ICE vehicles	77%	4%
Target percent of onroad construction vehicle fuel use that is zero emissions [2]	35%	100%
Target percent of fleet fuel use from ICE vehicles	65%	0%
Onroad construction emissions after measure implementation	809	-
Total GHG Reductions (MT CO2e)	149	40

Source:

[1] Renewable diesel and biodiesel are biogenic fuels, and emissions from their combustion are not counted towards Valley Water's total emissions. This is consistent with the California Air Resource Board's emissions counting conventions, which do not include biogenic CO2 in comparing emissions to State targets. See: California Air Resources Board. 2022. California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators. Available: https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf (at 12-13).

VF-1

Convert 35% of Valley Water's on-road fleet fuel use to zero-emission fuels (e.g., electricity, renewable diesel, biodiesel, hydrogen) by 2030, and 100% by 2045.

		Annual Reductions	
		2030	**2045**
Forecasted legislative-adjusted onroad fleet emissions (MT CO2e)		933	58
Estimate percent of VW fleet that is zero-emissions.	**2019**	**2030**	**2045**
Valley Water fleetwide legislative-adjusted emissions factor, (g CO2e / VMT)	622	478	26
Estimated percent of fleet fuel use that is zero-emissions, based on decline in emissions factors due to ACF and ACC2. In 2019 Valley Water's fleet is assumed to be all internal combustion vehicles.		23%	96%
Percent of fleet fuel use that is zero-emission under Advanced Clean Cars II (ACC II) and Advanced Clean Fleets (ACF)		23%	96%
Percent of fleet fuel use from internal combustion (ICE) vehicles under ACCII and ACF		77%	4%
Target percent zero-emission fuel use [1]		35%	100%
Target percent fuel use from ICE vehicles		65%	0%
Additional percentage of zero-emission fleet fuel use credited to this measure		12%	4%
Emissions after measure implementation (MT CO2e)		788	-
Total GHG Reductions (MT CO2e)		145	58

Note:

[1] Electric vehicles have zero tailpipe emissions, and are thus counted as zero-emission vehicles.

[2] 2019 is the midpoint of the 2017 - 2021 baseline period, and thus is used as an estimate of the fleet's emissions during that period.

OF-1

Require the use of zero-emission fuels (e.g., electricity, renewable diesel, biodiesel, hydrogen) instead of conventional diesel in 95% of Valley Water's offroad fleet fuel use in equipment by 2030, and 100% by 2045 regardless of engine Tier.

	Annual Reductions	
	2030	**2045**
Forecasted fleet offroad emissions (MT CO2e)	952	1,082
Zero-emission fuel targets	95%	100%
Percent fuel use in ICE vehicles after targets met	5%	0%
Emissions after targets met (MT CO2e)	48	-
Total GHG Reductions (MT CO2e)	904	1,082

Note:

Beginning January 1, 2024, offroad vehicles subject to the California Air Resource Board's Off-Road regulation are required to use only renewable diesel. This regulation excludes Tier 4 Final equipment, which has been required since model year 2013 for equipment over 25hp. However, this measure would require the use of renewable diesel regardless of Tier. See: California Air Resources Board. 2023. Fact Sheet: Renewable Diesel Fuel Requirements. Available: https://ww2.arb.ca.gov/resources/fact-sheets/fact-sheet-renewable-diesel-fuel-requirements.

HG-1

Replace high GWP refrigerants with low GWP alternatives above and beyond the requirements of SB 1206.

	Annual Reductions	
	2030	**2045**
Forecasted High-GWP emissions (MT CO2e)	79	79
Weighted average current GWP of refrigerants	1,542	1,542
Weighted Average GWP after replacement with low-GWP alternatives under SB 1206	750	750
Percent reduction in GWP	-51%	-51%
Total GHG Reductions (MT CO2e)	41	41

Source:

California Air Resources Board. 2023. SB 1206. Available:
https://ww2.arb.ca.gov/our-work/programs/sb-1206/about

FE-1			
Electrify 30% of existing facility energy use by 2030, and 76% by 2045.			
		Annual Reductions	
	2017-2021	**2030**	**2045**
Total emissions from combustion of natural gas in Valley Water buildings (MT CO2e)	745	745	745
Percent of natural gas end-use that is electrified [1]		30%	76%
Total GHG Reductions (MT CO2e)		224	567

Note:

[1] Assumes that procurement of additional zero-carbon electricity from the Power and Water Resources Pooling Authority (PWRPA) replaces gas heating in these buildings. Thus, there are no additional emissions from electricity.

EC-1

Implement a companywide commute challenge with rewards and competitions to encourage employees to reduce their VMT or reduce emissions from their commute vehicle. Offer a variety of incentives, including e-bike rebates, and parking cash-out programs.

	Annual Reductions	
Baseline employee commute emissions (MT CO2e)	**2030**	**2045**
Forecast legislative-adjusted employee commute emissions (MT CO2e)	651	129
Percent of programs implemented	50%	100%
Possible reductions from voluntary trip reduction program [1]	4%	4%
Total GHG Reductions (MT CO2e)	13	5

Source:

[1] See: California Air Pollution Control Officers Association. 2021. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Available: https://www.caleemod.com/documents/handbook/full_handbook.pdf (at 83). 4 percent is the maximum possible reduction from Measure T-5 (Implement Voluntary Commute Trip Reduction Program).

SW-1		
Divert 80% of waste from VW offices from landfills by 2030, and 90% by 2045. Improve solid waste tracking by conducting regular assessments of waste characterization.		
	Annual Reductions	
	2030	**2045**
Forecast legislative-adjusted solid waste emissions (MT CO2e)	236	236
Assumed diversion rate [1]	40%	40%
Landfill rate	60%	60%
Target diversion rate	80%	90%
Target landfill rate	20%	10%
Percent of forecasted emissions remaining after measure implementation	33%	17%
Emissions after measure implementation (MT CO2e)	79	39
Total GHG Reductions (MT CO2e)	157	197

Source:

[1] CalRecycle. 2023. State of Disposal and Recycling in California. Available: https://calrecycle.ca.gov/reports/stateof/.

WA-1

Increase communitywide water conservation to 98,800 acre-feet per year by 2030 and 118,000 per year by 2045.			*Annual Emissions*			
	2018	**2020**	**2019**	**2022**	**2030**	**2045**
Acre-feet per year conserved [1]	77,000	76,100	76,550	82,618	98,800	118,000
Net increase in acre-feet conserved, relative to baseline				6,068	22,250	41,450

Water Supply Master Plan 2040 - Supply and demand for water (acre-feet) [2]. 2022 and 2045 values interpolated.					
Source of Supply (Acre-Feet)	**2020**	**2022**	**2030**	**2040**	**2045**
Natural Groundwater Recharge	61,000	61,000	61,000	61,000	61,000
Local Surface Water	53,000	57,000	73,000	83,000	88,000
Reuse Water	21,000	22,800	30,000	33,000	34,500
San Francisco Public Utilities Commission	55,000	55,400	57,000	58,000	58,500
Delta-Conveyed	162,000	155,800	131,000	132,000	132,500
Average Supply	352,000	352,000	352,000	367,000	374,500
Demand	358,000	360,800	372,000	399,000	412,500

Emissions Factor Calculation

Inputs for calculation of weighted average 2030 Delta-conveyed emissions factor, MT CO2e / AF (See Imported Water Calculations)	**2022**	**2030**	**2045**
State Water Project (SWP) volume (AF)	36,284	37,772	38,205
Central Valley Project (CVP) volume (AF)	89,555	93,228	94,295
SWP emissions factor (MT CO2e/AF)	0.0944	0.0363	0.0000
CVP emissions factor (MT CO2e/AF)	0.00	0.00	0.00

Conveyance Emission Factors (MT CO2e / AF) [3]	**2022**	**2030**	**2045**
Natural Groundwater Recharge	0	0	0
Local Surface Water	0	0	0
Reuse Water	0	0	0
San Francisco Public Utilities Commission	0	0	0
Delta-Conveyed	0.0272	0.0105	0.0000

Calculate reductions in 2030 and 2045.	**2022**	**2030**	**2045**
Weighted average emissions factor per acre foot of water: Conveyance from source TO Valley Water (MT CO2e / AF)	0.01205	0.00390	-
Weighted average emissions factor per acre foot of water: Treatment and Distribution (FROM Valley Water to local supplier) (MT CO2e / AF)	0.0771	0.05026	0.00
Total emissions factor per acre-foot of water: extraction, conveyance, treatment, and distribution	0.08911	0.05415	-
Reduced GHG Emissions (MTCO2e) [8]		**301**	-

WA-1

WA-1: Calculate MTCO2e reductions from 2026-2045.

	Acre-feet conserved	**Weighted Average Emissions Factor (MTCO2e / acre-foot)**	**MTCO2e reduced (assumes 25 percent of savings directly attributable to Valley Water Programs) [8]**
2026	14,159	0.07	254
2027	16,182	0.07	272
2028	18,205	0.06	286
2029	20,227	0.06	296
2030	22,250	0.05	301
2031	23,530	0.05	297
2032	24,810	0.05	291
2033	26,090	0.04	283
2034	27,370	0.04	272
2035	28,650	0.04	259
2036	29,930	0.03	243
2037	31,210	0.03	225
2038	32,490	0.03	205
2039	33,770	0.02	183
2040	35,050	0.02	158
2041	36,330	0.01	131
2042	37,610	0.01	102
2043	38,890	0.01	70
2044	40,170	0.00	36
2045	41,450	0.00	-

WA-1 references

[1] Page 59-60 of Water Supply Master Plan: By 2030, Valley Water anticipates that current and planned conservation activities will result in 98,800 acre-feet per year in savings. Also see page 1: Valley Water estimates that water demand would be higher, by about 77,000 AF in 2018, if not for the combined efforts of Valley Water, the water retailers, and the community to conserve water. Available: Water Supply Master Plan. https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/Water_Supply_Master_Plan_2040_11_01_2019_v3.pdf.

Also see Wedednesday, April 11, 2018 Commission Meeting Agenda for 76,100 acre-feet of water conserved in 2020. Available: https://www.valleywater.org/sites/default/files/WC-Agenda-041118.pdf

[2] Water Supply Master Plan, page 10, Table 1: Average Baseline Water Supply through 2040. Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-public/Water_Supply_Master_Plan_2040_11_01_2019_v3.pdf
[3] Valley Water's emissions from water pumping and treatment are assumed to be zero for all sources except Delta-conveyed (i.e., Central Valley Project [CVP] and State Water Project [SWP]) water.
[4] Total Annual Water Use by Local Water Utility, available in Water Conservation Strategic Plan (Valley Water 2021), page 32. Available: https://s3.us-west-1.amazonaws.com/valleywater.org.us-west-1/s3fs-
[5] Power Content Labels. Available: https://www.energy.ca.gov/media/9281. 2030 emissions factor interpolated assuming zero-carbon by 2045.

[7] California Electricity (kWh/AF) and Natural Gas (MMBtu/AF) Energy Intensities by Hydrologic Region, by Water Cycle Stage, page 19. San Francisco Bay value used.
[8] Assuming that 25 percent of emissions reductions are attributable to Valley Water's programs. Greene, Samantha. Water Resources Planning and Policy Manager. Santa Clara Valley Water District, San Jose, CA. August 16, 2024-- feedback provid

CS-1

Salt Marsh Restoration Project

	Shoreline Phase 1 Total Acres [1]
Year Restoration Begins	2030
Total Salt Marsh Acres Restored per project details	2,783

[1] James Ujah (Valley Water PM) estimates that it may be 2030 until pond breaching begins

MT CO2e sequestered per acre per year from salt marsh restoration [2]
3.6

[2] Carbon Sequestration in Eden Landing (SF Bay) Tidal Marsh Restoration	Amount	Standard Deviation	Min [3]	Max [3]
Annual CH4 emissions (g C-CH4 per m2 per year)	0.6	0.3	0.3	0.9
Net Uptake (g C-CO2 per m2 per year)	-407.4	47.1	-454.5	-360.3
Lateral Loss for Uptook Carbon (g C-CO2 per m2 per year) [3]	320	30	290	350
Net Uptake within Project Boundaries (g C-CO2 per m2 per year)	-87.4	77.1	-164.5	-10.3

Mol Conversion	
CH4:C	1.3
CO2:C	3.7

	Amount	SD	Min	Max
Annual CH4 emissions (MT CH4 per acre per year)	0.003	0.002	0.002	0.005
Annual CH4 emissions (MT CO2e per acre per year)	0.088	0.044	0.044	0.131
Annual CO2 emissions (MT CO2 per acre per year)	-6.0	0.7	-6.7	-5.3
Annual CO2 emissions lost laterally (MT CO2 per acre per year)	4.7	0.4	4.3	5.2
Total CO2 emissions (MT CO2e per acre per year)	**-1.2**	**1.2**	**-2.4**	**-0.02**
Total CO2 emissions assuming 50% Lateral Loss [3] (MT CO2e per acre per year)	-3.6	1.0	-4.5	-2.6

[2] Shahan et al 2022

[3] According to Shahan et al 2022, it is not clear what the fate is of the carbon that is lost laterally into the bay. However, according to studies addressing the carbon flux of coastal oceans find that most oceans except for those in tropical areas are net sinks of carbon rather than net sources. Thus, it can be argued that the fate of the carbon lost into the Bay is likely to be kept sequestered from the atmosphere. Even so, given the ongoing research, it was conservatively assumed that 50% of carbon sequestered that is laterally lost is reemitted into the atmosphere.

CS-1

Year	Acres restored [1]	Annual MT CO2e reductions from sequestration projects: Shoreline Phase I
2025		-
2026		-
2027		-
2028		-
2029		-
2030	50	179
2031	76	273
2032	103	370
2033	142	510
2034	181	649
2035	264	945
2036	346	1,241
2037	690	2,474
2038	1,034	3,707
2039	1,349	4,835
2040	1,592	5,705
2041	1,897	6,798
2042	2,202	7,892
2043	2,275	8,153
2044	2,278	8,161
2045	2,280	8,170
Total	**2025-2030**	179
Total	**2025-2045**	60,063

[1] Based on restoration rates of nearby ponds and planned breach in 2030

Calculation of credit needed to meet Carbon Budget

	2025-2030	2025-2045
Sequestration per restored acre per year (MT CO2e)	3.58	3.58
Cumulative Reductions from Shoreline Project (MT CO2e)	179	60,063
Gap with measures (MT CO2e) [1]	0	0
Remaining Gap with CS-1 (MTCO2e)	-179	-60,063

[1] Positive number means carbon budget exceeded. Negative means carbon budget met with excess reductions.

CS-1										

Annual Restoration Calculation for Shoreline

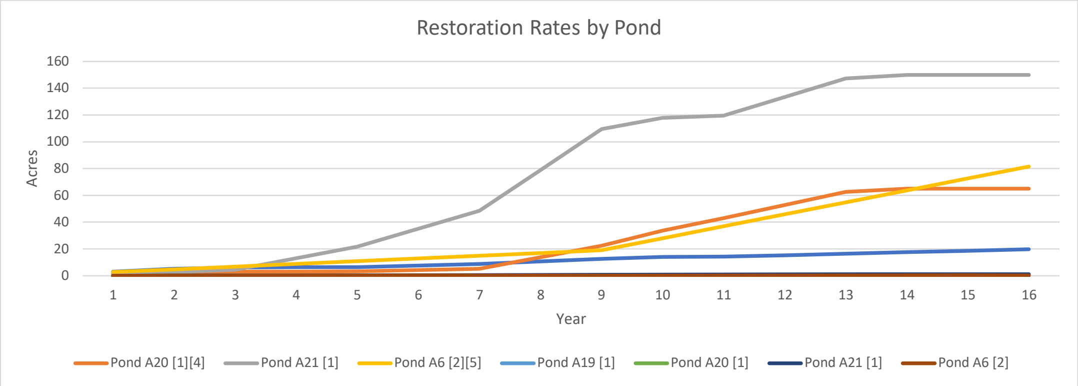
Shoreline Pond	Matching Previously Restored Pond by Equivalent Restoration Rate	Reason for Match
A9	A21	A9 abuts the bay, similar to A21
A10	A20	A10 is similarly oriented away from the A9 as A20 is to A21.
A14	A20	A14 is similarly oriented away from the A9 as A20 is to A21.
A11	A20	A11 is similarly oriented away from the A9 as A20 is to A21.
A15	A21	Closest in distance to A21, right across from Coyote Creek
A13	A19	A13 is similarly oriented away from the A9 as A19 is to A21.
A12	A19	A12 is similarly oriented away from the A9 as A19 is to A21.

Annual Restoration Rate by Pond *Calculated*

	Past Restoration Projects (Acres Restored by Year by Pond)				Past Restoration Projects (Percent Restored by Year by Pond)			
Total Pond Acres [3]-->	265	65	150	360	265	65	150	360
Year Since Restoration Began	Pond A19 [1]	Pond A20 [1][4]	Pond A21 [1]	Pond A6 [2][5]	Pond A19 [1]	Pond A20 [1]	Pond A21 [1]	Pond A6 [2]
0	3	2	1	3	1%	2%	1%	1%
1	5	2	3	5	2%	3%	2%	1%
2	6	3	4	7	2%	5%	3%	2%
3	6	3	13	9	2%	5%	9%	2%
4	6	3	22	11	2%	5%	14%	3%
5	8	4	35	13	3%	6%	23%	4%
6	9	5	48	15	3%	8%	32%	4%
7	11	14	79	17	4%	21%	53%	5%
8	13	22	109	19	5%	34%	73%	5%
9	14	33	118	28	5%	52%	79%	8%
10	14	43	120	37	5%	66%	80%	10%
11	15	53	133	46	6%	81%	89%	13%
12	16	63	147	55	6%	96%	98%	15%
13	17	65	150	64	7%	100%	100%	18%
14	19	65	150	73	7%	100%	100%	20%
15	20	65	150	82	7%	100%	100%	23%

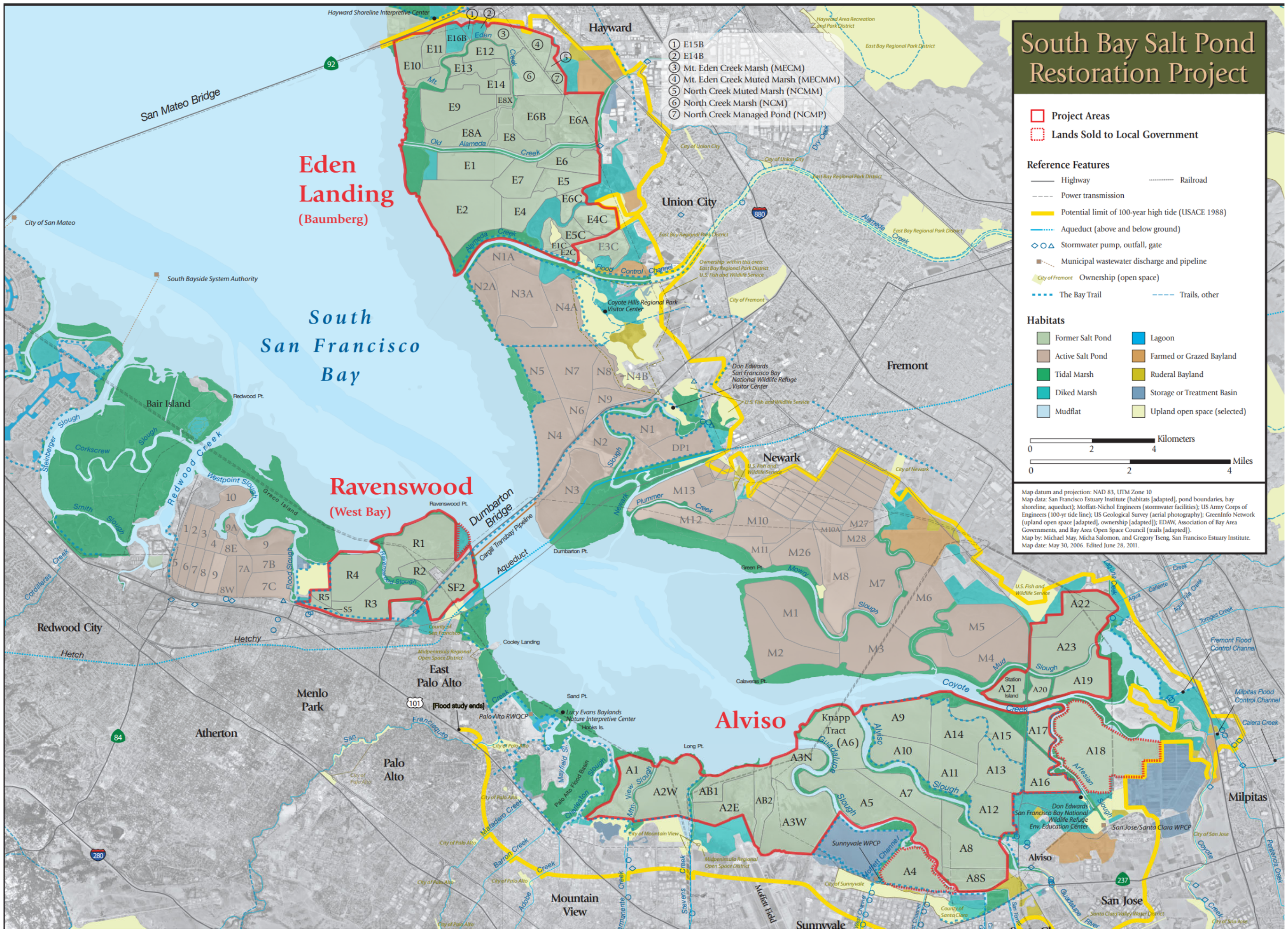
[1] Valley Water 2015. ISLAND PONDS MITIGATION MONITORING ANDREPORTING YEAR 10
[2] Valley Water 2012. Habitat Evolution Mapping Project South Bay Salt Pond Restoration Project. (2009-2011) and Valley Water 2022. Habitat Evolution Mapping Project Decadal Update 2019 & 2021. Final Report. (A6 not used. For comparison only. A6 has a berm at the border with the bay.)
[3] Valley Water 2025. Calabazas/San Tomas Aquino Creek–Marsh Connection Project Final Feasible Alternatives Report. (See Section 3.3.2)
[4] Trends change significantly after the 7th year. Forecasts after Year 9 are based on trends from Year 7 to year 9 and max out at 65 acres, the total pond size.
[5] Trends change significantly after the 8th year. Forecasts after Year 10 are based on trends from Year 8 to year 10.

CS-1



	Calculated Restoration Rate of Shoreline Ponds [1][2] (Acres by year of restoration)								All Ponds	
Acres per Pond -->	365	250	260	280.2	263.4	340	250	774.4	2,783	
Year Since Restoration Began	A9	A10	A11	A12	A13	A14	A15	A18	**Total**	Weighted Average restoration rate
0	3	6	6	3	3	8	2	19	50	2%
1	6	8	9	5	5	12	4	26	76	3%
2	10	11	12	6	6	15	7	35	103	4%
3	31	12	12	7	6	16	22	36	142	5%
4	53	12	13	7	6	17	36	38	181	7%
5	85	16	17	8	7	22	58	50	264	9%
6	118	20	21	9	9	27	81	62	346	12%
7	192	53	55	11	11	72	132	164	690	25%
8	266	86	90	13	13	117	182	267	1034	37%
9	287	129	134	15	14	175	197	399	1349	48%
10	291	165	172	15	14	224	199	511	1592	57%
11	325	203	211	16	15	276	222	629	1897	68%
12	359	241	250	17	16	327	246	746	2202	79%
13	365	250	260	18	17	340	250	774	2275	82%
14	365	250	260	20	18	340	250	774	2278	82%
15	365	250	260	21	20	340	250	774	2280	82%

[1] Calculated based on matching previously restored ponds (A6, A19-A21)
[2] Total Acres based on 2015 South San Francisco Bay Shoreline Phase I Study (Table 4.6-7. Post-Restoration Conditions in the Study Area).



Source: South Bay Restoration Project. Updated June 2011.
https://www.southbayrestoration.org/page/maps

Appendix B

GHGRP Consistency Review Checklist

SANTA CLARA VALLEY WATER DISTRICT

GREENHOUSE GAS REDUCTION PLAN CONSISTENCY REVIEW CHECKLIST

Introduction and Purpose

The Valley Water Greenhouse Gas Reduction Plan (GHGRP) outlines the actions the Valley Water will undertake to achieve greenhouse gas (GHG) emissions reductions. As part of GHGRP implementation, the GHGRP Consistency Checklist (Checklist) has been developed to ensure that Valley Water-led discretionary projects appropriately incorporate all applicable GHG reduction measures from the GHGRP into project design, planning, and implementation on a project-by-project basis. Implementation of these measures will ensure that projects are executed consistently with the assumption supporting relevant GHGRP strategies toward achieving Valley Water's identified GHG reduction targets.

The Checklist, in conjunction with the GHGRP, provides a streamlined review process for proposed Valley Water projects subject to discretionary review that triggers environmental review pursuant to the California Environmental Quality Act (CEQA). Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The GHGRP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to cumulative GHG emissions may be determined to be less than significant if it complies with the applicable measures in a "plan for the reduction of GHG emissions" (e.g., GHGRP). Under these provisions, if a project can show consistency with applicable GHG reduction measures, the level of analysis for the project required under CEQA with respect to GHG emissions can be reduced considerably (i.e., a detailed analysis of project-level GHG emissions and potential climate change impacts is not needed).

Valley Water will complete a Checklist for projects requiring environmental review pursuant to CEQA. This Checklist is designed to assist Valley Water in identifying the minimum GHGRP-related requirements specific to the proposed project. However, the final determination of a project's consistency with the Checklist will be made by Valley Water's GHGRP Implementation Team before the agency's review process ends. As a result, it may be necessary to supplement the completed Checklist with supporting materials, calculations, or certifications to demonstrate full compliance with the Checklist requirements.

Projects requiring discretionary review that cannot demonstrate consistency with the GHGRP using this Checklist will be required to prepare a separate, more detailed project-level GHG analysis as part of the applicable CEQA document.

Applicability

This Checklist is intended for Valley Water construction-only projects, not for operational projects (e.g., new buildings and facilities requiring energy use). For land use projects, such as new buildings or operational facilities, projects must show mark "yes" or N/A for all questions in this Checklist and show consistency with GHGRP Measures VF-1, OF-1, HG-1, FE-1, EC-1, and SW-1. The GHGRP Implementation Team will determine the final consistency determination with the GHGRP.

Section A. General Project Information

Projects required to complete this Checklist must first provide the following information:

Project Name and Project Number:	
Property Address/Location:	
Project Footprint (Acres):	
Project Description: (submit separate attachments if necessary)	
Existing Land Use of the Property: (General Description, including an assessment of existing vegetation)	

Section B: GHGRP Measures

The completion of this Checklist will document a project's compliance with the applicable GHG reduction measures in Valley Water's GHGRP. The compliance requirements apply to projects that include discretionary review, require environmental compliance, and are not exempt under CEQA.

All applicable Checklist questions must be answered "Yes," and documentation must be provided that substantiates how compliance would be achieved. For measures for which a "Yes" is indicated, the features must be demonstrated as part of the project's design and described. All applicable requirements in the checklist will be included in the conditions of approval or issuance of building permit stage of project approval.

If any questions are marked with a "No," the project cannot be determined to be consistent with the GHGRP, and project-specific GHG analysis and mitigation would be required.

If any questions are marked "N/A" (meaning "not applicable"), a statement describing why the question is not applicable shall be provided to the satisfaction of the GHGRP Implementation Team.

Checklist Requirement	Corresponding GHGRP Measure	Yes	No	N/A
On- and Off-Road Equipment				
1) Per measure CN-1, will at least 17 percent of the Project's construction off-road fuel use be zero-emission by 2030, and (if construction is ongoing) at least 45 percent by 2045?	CN-1	☐	☐	☐
2) Per measure CN-2, will at least 35 percent of the Project's construction on-road fuel use be zero-emission by 2030, and (if construction is ongoing) at least 95 percent by 2045?	CN-2	☐	☐	☐
3) Per measure CN-1 and CN-2, will the project apply all feasible construction best management practices (BMPs) recommended in Table 6-1 of the Bay Area Air Quality Management District's 2022 CEQA Guidelines, as shown in Section C, or latest analogous set of BMPs?	CN-1 and CN-2	☐	☐	☐
4) Will contractors track and monitor fuel uses for all construction equipment and vehicles and annually submit fuel and electricity use data[1] for submission to the GHGRP Implementation Team, including the annual accounting of emissions?	CN-1 and CN-2	☐	☐	☐
Carbon Storage and Sequestration				
5) If the project results in the removal of vegetation, will the removed vegetation be composted, landfilled, reused, or otherwise avoid direct combustion?	CS-1	☐	☐	☐

If the answers to the questions above **are either N/A or Yes**, please provide the GHGRP Implementation Team with:

- Project documentation in an attachment showing the types of vehicles used, their estimated annual hours of operation, projected fuel usage (including both zero-carbon fuels and conventional fuels), if applicable, and
- Project documentation showing how the removal of existing vegetation, if any, will be treated and the difference in carbon sequestration rates for the project land use between existing conditions and project build-out.

Pending review and approval of this documentation by GHGRP Implementation Team, your project is streamlined and does not need to conduct further GHG analysis or propose additional mitigation measures.

If the answer to **EITHER of the questions above is No**, please provide GHGRP Team with documentation of your project's total construction emissions and effect on existing vegetation (i.e., existing carbon storage) and carbon sequestration.

- If the GHGRP Implementation Team determines that emissions from your project will allow Valley Water to stay within the allotted carbon budget, your project is streamlined and does not need to conduct further GHG analysis or propose additional mitigation measures.
- If the GHGRP Implementation Team determines that the net emissions from your project will NOT ALLOW Valley Water to stay within the allotted carbon budget, this project cannot streamline from the GHGRP to determine significance for GHG impacts; and the project must complete a separate CEQA document (e.g., an Environmental Impact Report) that includes a project-specific GHG impact analysis and proposes mitigation measures.

If "N/A" has been checked for any question, please provide a statement explaining why the measure is not applicable. Include attachments, if needed.

____

____

____

____

[1] Fuel and electricity use data include, but are not limited to, gallons of renewable diesel, gallons of conventional diesel, kWh of electricity and name of utility from which electricity is purchased.

Section C. Supporting Tables

Table C-1 Best Management Practices for Construction-Related GHG Emissions

1.	Use zero-emission and hybrid-powered equipment to the greatest extent possible, particularly if emissions are occurring near sensitive receptors or located within a Bay Area Air District-designated Community Air Risk Evaluation (CARE) area or Assembly Bill 617 community.
2.	Require all diesel-fueled off-road construction equipment be equipped with EPA Tier 4 Final compliant engines or better as a condition of contract.
3.	Require all on-road heavy-duty trucks to be zero emissions or meet the most stringent emissions standard, such as model year (MY) 2024 to 2026, as a condition of contract.
4.	Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to no more than 2 minutes (A 5-minute limit is required by the state airborne toxics control measure [Title 13, Chapters 2449(d)(3) and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site and develop an enforceable mechanism to monitor idling time to ensure compliance with this measure.
5.	Prohibit off-road diesel-powered equipment from being in the "on" position for more than 10 hours per day.
6.	Use California Air Resources Board–approved renewable diesel fuel in off-road construction equipment and on-road trucks.
7.	Use U.S. Environmental Protection Agency SmartWay certified trucks for deliveries and equipment transport.
8.	Require all construction equipment is maintained and properly tuned in accordance with manufacturer's specifications. Equipment should be checked by a certified mechanic and determined to be running in proper condition prior to operation.
9.	Where grid power is available, prohibit portable diesel engines and provide electrical hook ups for electric construction tools, such as saws, drills and compressors, and using electric tools whenever feasible.
10.	Where grid power is not available, use alternative fuels, such as propane or solar electrical power, for generators at construction sites.
11.	Encourage and provide carpools, shuttle vans, transit passes, and/or secure bicycle parking to construction workers and offer meal options onsite or shuttles to nearby meal destinations for construction employees.
12.	Reduce electricity use in the construction office by using LED bulbs, powering off computers every day, and replacing heating and cooling units with more efficient ones.
13.	Minimize energy used during site preparation by deconstructing existing structures to the greatest extent feasible.
14.	Recycle or salvage nonhazardous construction and demolition debris, with a goal of recycling at least 15% more by weight than the diversion requirement in Title 24.
15.	Use locally sourced or recycled materials for construction materials (goal of at least 20% based on costs for building materials and based on volume for roadway, parking lot, sidewalk and curb materials). Wood products used should be certified through a sustainable forestry program.
16.	Use low-carbon concrete, minimize the amount of concrete used and produce concrete on-site if it is more efficient and lower emitting than transporting ready-mix.
17.	Develop a plan to efficiently use water for adequate dust control since substantial amounts of energy can be consumed during the pumping of water.
18.	Include all requirements in applicable bid documents, purchase orders, and contracts, with successful contractors demonstrating the ability to supply the compliant on- or off-road construction equipment for use prior to any ground-disturbing and construction activities.

Source: Bay Area Air District 2022: Table 6-1.

Section D: References

Bay Area Air Quality Management District. 2022. *California Environmental Quality Act Air Quality Guidelines*. Appendix C: Guidance for GHG Reduction Strategies. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-c-ghg-reduction-strategies_final_edits-for-ascent-pdf.pdf?rev=8e5bb7d8ad504dd6accd3c04e58bdf87&sc_lang=en. Accessed March 1, 2024.

Appendix C

Renewable Diesel Considerations

This appendix provides technical details on renewable diesel how it can be used to decarbonize vehicles and equipment. It also describes supply and demand dynamics with this fuel, which Valley Water should consider when incorporating them into its decarbonization strategy.

Renewable diesel is a biogenic fuel that can help Valley Water reduce its emissions from fleet operations, as well as in contracted construction vehicles. As a biogenic fuel, CO_2 emissions from combustion of renewable are not counted towards Valley Water's total GHG emissions. This is consistent with the California Air Resource Board's (CARB's) emissions counting conventions, which do not include biogenic CO_2 in comparing emissions to State GHG reduction targets (CARB 2022: 12-13).

Renewable diesel is currently available in Santa Clara County, with 24 active renewable diesel fueling stations (DOE 2023a). Since 2020, the price of renewable diesel has been comparable to that of conventional diesel, ranging from 30 cents per gallon cheaper to 9 cents per gallon more expensive (DOE 2023b).

In the near term, both supply and demand for renewable diesel fuel are expected to increase. On the supply side, eight new renewable diesel refineries in the United States began operation in 2022 and early 2023, which is projected to more than double domestic production (US EIA: 2023a). On the demand side, consumption is anticipated to rise for these fuels due to state-level renewable and low-carbon fuel standards and the Inflation Reduction Act (IRA) tax credits. It is, therefore, possible that a feedstock "crunch" may be approaching, where these fuels may not necessarily be readily available (International Energy Agency 2022). Additionally, supply of these fuels is dependent on imports from other countries. For instance, the United States imports substantial quantities of renewable diesel from Singapore, and biodiesel from Canada, Germany, Italy, South Korea, and Spain (U.S. EIA: 2023b). Future demand in these or other countries (due, for instance, to these countries implementing their own low-carbon fuel standards) may impact the availability of renewable diesel in the United States.

References

California Air Resources Board. 2022. California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators. Available: https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf. Accessed January 24, 2024.

CARB. *See* California Air Resources Board.

DOE. *See* U.S. Department of Energy.

International Energy Agency. 2022. Is the biofuel industry approaching a feedstock crunch? Available: https://www.iea.org/reports/is-the-biofuel-industry-approaching-a-feedstock-crunch. Accessed January 24, 2024.

U.S. Department of Energy. 2023a Alternative Fuels Data Center: Alternative Fuels Station Locator. Available: https://afdc.energy.gov/stations/#/analyze?country=US&region=US-CA&fuel=BD&fuel=RD. Accessed January 24, 2024.

———. 2023b Alternative Fuels Data Center: Fuel Prices. Available: https://afdc.energy.gov/fuels/prices.html. Accessed January 24, 2024.

U.S. EIA. *See* U.S. Energy Information Administration.

U.S. Energy Information Administration. 2023a. Domestic renewable diesel capacity could more than double through 2025. Available: https://www.eia.gov/todayinenergy/detail.php?id=55399. Accessed January 24, 2024.

———. 2023b. US Imports by Country of Origin. Available: https://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_EPOORDO_im0_mbbl_m.htm. Accessed January 24, 2024.

Appendix D

Inventory and Forecasting
Technical Memo

Memo

455 Capitol Mall, Suite 300
Sacramento, CA 95814
916.444.7301

Date: September 12, 2025

To: Lisa Bankosh, Nick Mascarello, Samantha Greene (Santa Clara Valley Water District), Ryan Jolley (GEI Consultants)

From: Fred Hochberg, Brenda Hom, John Steponick, Honey Walters (Ascent)

Subject: Santa Clara Valley Water District GHG Inventory and Forecast

---

PROJECT OVERVIEW

Ascent is supporting the Santa Clara Valley Water District (hereinafter referred to as "Valley Water") with preparation of a Climate Action Plan (CAP) that meets the requirements set forth in Section 15183.5 of the State's California Environmental Quality Act (CEQA) Guidelines—commonly referred to as a "CEQA-qualified CAP." A CEQA-qualified CAP provides the ability to streamline greenhouse gas (GHG) analyses of new Valley Water projects subject to CEQA compliance, and consists of the following attributes:

- Quantifies GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- Establishes a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;
- Identifies and analyzes GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- Specifies 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 levels; and
- Is adopted in a public process following preparation and adoption of CEQA documentation.

Though all of these are attributes of a CEQA-qualified CAP, this memorandum (memo) addresses the first three items above. The last two items will be addressed in future deliverables.

ORGANIZATION OF THIS MEMORANDUM

This memo consists of two overarching sections:

- **Section 1: GHG Emissions Inventory** describes the data, calculation methods, and modeling results for Valley Water's GHG inventory. It also contains a discussion of the emissions sectors that are included in this inventory and the reasons for the use of average annual emissions across 2017-2021 as the appropriate inventory baseline against which reductions will be measured.

- **Section 2: GHG Emissions Forecasts** describes the data, calculation methods, and modeling results for Valley Water's GHG forecasts. Two sets of GHG forecast results are presented: the "business as usual" (BAU) scenario and the legislative-adjusted BAU (legislative-adjusted) scenarios for years 2030 and 2045. The BAU scenario is a forecast that takes into account growth in emissions-causing activity levels over time but does not account for GHG emissions reductions resulting from policies and regulations adopted by regional, State, or federal agencies. The legislative-adjusted scenario reflects policies and regulations enacted by regional, State, and federal agencies, without considering any Valley Water actions to reduce GHG emissions.

1 GHG EMISSIONS INVENTORY

The emissions included in this inventory generally follow the guidelines recommended in *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (Community Protocol) (ICLEI 2019), which is also recommended for Bay Area jurisdictions in the Bay Area Air District's 2022 CEQA Guidelines.

1.1 INVENTORY SECTORS

There are 12 GHG emissions sectors analyzed and presented in this memo. These are classified under Scope 1, Scope 2, or Scope 3. Four of the sectors are within Scope 1, one under Scope 2, and the remaining seven under Scope 3. All 12 sectors are described further below, organized by Scope.

Scope 1

Scope 1 emissions are those directly generated by Valley Water operations, and are generally divided into four categories: (1) stationary combustion (e.g., fuels, heating source), (2) mobile combustion (e.g., Valley Water-operated on- and off-road vehicles and equipment), (3) fugitive emissions (e.g., high-global warming potential (GWP) gases that are released from air conditioning and refrigeration), and (4) process emissions (e.g., emissions produced from industrial processes). For Valley Water operations, the following sectors were classified under Scope 1:

- **Natural Gas Use in Buildings.** Valley Water buildings (e.g., offices, pumping plants, and water treatment plants) combust natural gas from Pacific Gas and Electric Company (PG&E) for space and water heating.
- **On-Road Fleet**. Valley Water owns and operates a combination of light and heavy-duty vehicles to transport employees and perform maintenance on its assets. These vehicles consume gasoline.
- **Off-Road Fleet.** Valley Water owns and operates construction equipment and other heavy-duty equipment that consume diesel.
- **High GWP Gases.** Valley Water purchases refrigerants for its buildings.

For Natural Gas Use in Buildings, On-Road Fleet, and Off-Road Fleet, emissions directly result from the combustion of fuel—natural gas, gasoline, and diesel, respectively. For High GWP Gases, emissions result from gases released from air conditioning and refrigeration.

Scope 2

Scope 2 emissions are considered indirect emissions from an entity's operations, and are primarily caused by electricity use. Specifically, for Valley Water operations, the following sector was classified under Scope 2:

- **Facility Electricity Usage.** Valley Water facilities and buildings consume electricity procured from PG&E, Power and Water Resources Pooling Authority (PWRPA), San Jose Clean Energy (SJCE), and Silicon Valley Clean Energy

(SVCE). Electricity use in facilities includes pumping and water treatment activities. Electric usage in buildings include loads such as lighting, appliances, air conditioning, plug loads, and electric vehicle (EV) charging stations in the office parking lots.

Scope 3

Scope 3 emissions include all of an entity's indirect emissions not captured in Scopes 1 and 2. These emissions represent both upstream and downstream activities related to an entity's operations. They are dictated by human behaviors that Valley Water may attempt to influence but are ultimately the result of the choices made by customers, employees, contractors, service providers, and other external entities. Specifically, for Valley Water operations, the following sectors were classified under Scope 3.

- **Imported Water.** Valley Water imports water from two sources, the State Water Project (SWP) and the Central Valley Project (CVP). Extraction and conveyance[1] of this water results in the consumption of electricity, which in turn results in emissions.
- **Employee Commute**. Valley Water employees commute to work in light-duty vehicles, which generally combust gasoline or use electricity.
- **Business Travel.** Valley Water employees use a combination of passenger cars (which combust gasoline or use electricity) and airplanes (which combust aviation gasoline) for business travel.
- **Construction.** Valley Water services include building and maintaining a water conveyance and treatment system, flood protection assets, environmental stewardship projects, offices, and other facilities. These activities produce emissions through activity such as operation of construction equipment (e.g., bulldozer, cranes, off-road equipment, drills, demolition equipment, generators), haul trucks, construction worker commute, and electricity consumption from the grid. These emissions are typically covered in project GHG impact analyses performed as part of CEQA compliance. This sector of emissions includes third-party construction activities conducted by contractors hired by Valley Water to perform work. Some construction activities are performed by fleet vehicles and equipment owned by Valley Water, which are included in Scope 1.
- **Solid Waste.** Valley Water facilities produce landfilled materials that decompose and produce methane (CH_4), which is a GHG.
- **Wastewater.** Valley Water facilities produce wastewater. Anaerobic decomposition of this wastewater produces CH_4.
- **Sediment Hauling**. Valley Water performs sediment management on its system to remove sediment from waterways. This work involves contracting with third party companies using dump trucks to haul sediment from the jobsite to nearby landfills as needed. The dump trucks consume diesel.

1.2 INVENTORY DATA SOURCES

Valley Water provided data on its activities (i.e., the actions which drive emissions, such as electricity usage or vehicle miles traveled [VMT]). These activity levels were multiplied by the appropriate emissions factors to calculate total emissions. Emissions of CH_4 and nitrous oxide (N_2O), both of which are GHGs, were converted to metric tons of

[1] Extraction is defined as taking the water from its point of origin, such as a river or aquifer, and conveyance is defined as moving the water from the river or aquifer to its destination—in this case, to Valley Water's service territory.

carbon dioxide equivalent ($MTCO_2e$)[2] per unit of activity. Additionally, some data sources lacked consistent data coverage for all years, resulting in some missing information. The available data is presented here.

Table 1 below shows a summary of the activity data provided; details on the calculation of emissions from that activity are described in the remainder of Section 1 below.

Table 1 Overview of Activity Data Used in Inventory Calculations

Scope	Emissions Sector	Activity Source
1	Natural Gas Use in Buildings	Total therm usage from PG&E for Valley Water buildings, 2009 – 2021
	On-Road Fleet	Total gallons of gasoline for on-road Valley Water fleet, 2009 – 2021
	Off-Road Fleet	Total gallons of diesel for off-road Valley Water fleet, 2009 – 2021
	High GWP Gases	Total purchases of refrigerants and other high GWP gases for Valley Water, 2009 - 2012
2	Facility Electricity Usage	Total MWh usage by Valley Water facility, 2009 – 2021
3	Imported Water	Acre-feet of water imported by Valley Water, 2014 – 2021
	Employee Commute	Number of commuting and telecommuting employees, 2010 – 2021
	Business Travel	Total dollars spent on reimbursement for business travel, 2018 – 2021
	Construction	Historical emissions compiled from CEQA documents, 2010 – 2021
	Solid Waste	Number of FTEs, 2010 – 2021
	Wastewater	Number of FTEs, 2010 – 2021
	Sediment Hauling	Tonnages of landfilled, recycled, and composted waste, 2018 – 2021

Notes: CIP = Valley Water's Five-Year Capital Improvement Program; FTE = full-time employee; GWP = global warming potential; MWh = megawatt-hours; PG&E = Pacific Gas and Electric Company.

Source: Prepared by Ascent in 2025.

Excluded Emissions

Valley Water's GHG inventory follows the reporting requirements presented in the Community Protocol. As such, it excludes the following emissions:

- **"Consumption-based" emissions**, such as lifecycle upstream emissions associated with the manufacture of construction materials (e.g., cement, iron, lumber). This follows the standard recommendations included in the Community Protocol, which does not require local government reporting entities to report "consumption-based" emissions (ICLEI 2019:18). Additionally, GHG inventories prepared by public agencies in California do generally not include emissions associated with the manufacturing and use of materials because there are no Bay Area Air District or California Air Resources Board (CARB) requirements to include lifecycle emissions in local GHG inventories and forecasts. Furthermore, CARB regulates GHG emissions associated with the industrial sector involved with the manufacture of these materials through programs such as, Cap and Trade and the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, as well as industry-specific regulations.

  With respect to cement, which is known to emit CO_2 through the calcination process during its production, CARB is currently developing a strategy to reduce emissions for the cement sector to 40 percent below baseline levels by 2035 and to net-zero by2045 per the requirements of Senate Bill 596. Valley Water will track CARB's cement emission reduction strategy and will evaluate the inclusion of concrete emissions in future inventories and

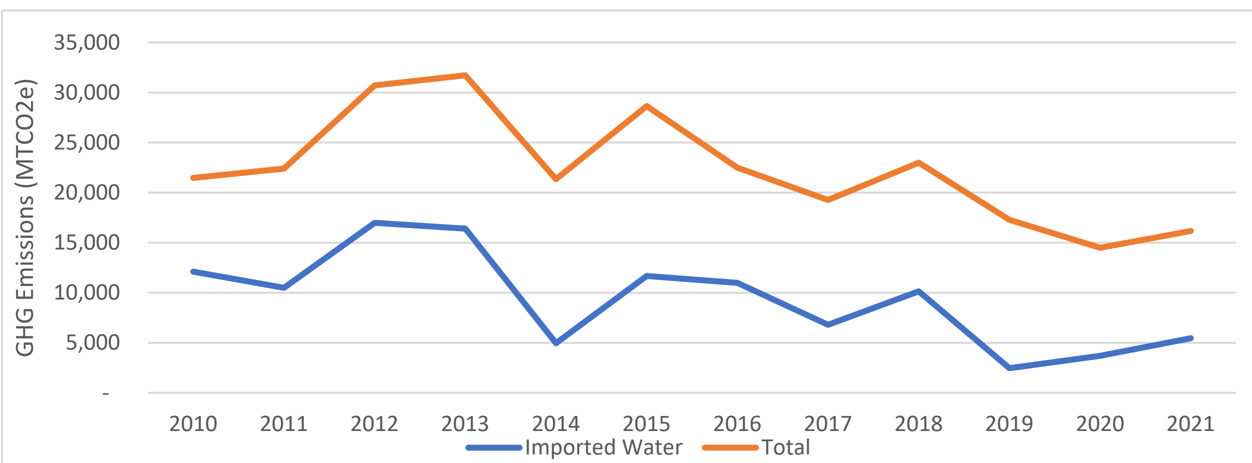
[2] In addition to carbon dioxide (CO_2), carbon dioxide equivalent (CO_2e) includes the GWPs of gases such as CH_4 and N_2O, if those gases are present in emissions. It is a standard unit of measure for carbon inventories. All the carbon emissions data presented in this memo use CO_2e as the unit of measurement. CO_2, CH_4 and NO_2 are converted to their CO_2e values by multiplying their mass with GWP values of 1, 27, and 273, respectively (IPCC 2022).

forecasts, along with potential measures to reduce them that could be added to the GHGRP during future updates.

- **CH_4 emissions from wetlands and reservoirs**. CH_4 emissions can occur due to the decomposition of organic matter under anaerobic conditions, which occur in wetlands as well as by the creation and maintenance of reservoirs through flooding. A 2020 EPA study suggested that CH_4 emissions from reservoirs could be as large as a quarter of CH_4 emissions from landfills or the fourth largest source of anthropogenic GHGs (Beaulieu et.al., 2020). Although the Community Protocol provides some guidance on including emissions from wetlands, estimating CH_4 emissions from reservoirs is a relatively new area of study and research methods are still being improved (EPA 2024, EPA 2022). Additionally, these emissions are not included in the Community Protocol's reporting requirements. For these reasons, these emissions are excluded from the inventory at this time, but Valley Water may consider including such emissions separately in future GHGRP updates.

1.3 BASELINE CALCULATION METHODS

To calculate emissions reductions for the purposes of a CEQA-qualified CAP, a baseline year or average across a set of years must be assumed that reflects emissions in a typical year. In the case of Valley Water, average emissions were taken across multiple years—2017 to 2021 for all sectors except Employee Commute, Business Travel, Sediment Hauling, and High GWP Gases.[3] This five-year range was selected for two reasons. First, Valley Water's emissions are variable year over year. These emissions correlate strongly with imported water emissions, as shown in Figure 1 below. The quantity of imported water, and thus the associated emissions, vary substantially year over year depending on factors including temperature, snowpack, precipitation, and other hydrological conditions. Selecting a single year would not capture the variability in these emissions and thus could overstate or understate a typical year. Selecting multiple years more accurately reflects a long-term average.



Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Modeled by Ascent in 2025.

Figure 1 Comparison of Valley Water Imported Water Emissions and Total Emissions

[3] 2020 and 2021 values for the Employee Commute and Business Travel emissions sectors were excluded from the average due to COVID-19 impacts. Additionally, no data for the Sediment Hauling and Business Travel emissions sectors were available for 2017, so these years were excluded from the calculation. Data on high GWP gases was only available for 2009 through 2012.

Second, Valley Water has procured zero-carbon PWRPA power for its buildings since 2016. PWRPA represents over 94 percent of Valley Water's electric load, depending on the year. Therefore, data older than 2016 are outdated and would not reflect the current power portfolio.

For these reasons, an average of annual emissions from 2017 to 2021 was chosen as the baseline level in this inventory.

1.4 INVENTORY EMISSIONS RESULTS

The following section presents the inventory emissions calculations and results for each of the sectors listed in Section 1.1. Data prior to 2017 is presented here for comprehensiveness and to demonstrate general trends in energy use from earliest available data and is not used in developing the baseline.

Natural Gas Use in Buildings

Valley Water provided data on natural gas usage in their buildings by year, which are summarized in Table 2 below, along with the associated GHG emissions. It was assumed that each therm of natural gas produced approximately 5.3 kilograms of CO_2e (EPA 2023a). Upstream emissions associated with pipeline leakage and leakage at end-uses (e.g., incomplete combustion at ignition) are assumed to be 2.3 percent and 0.5 percent of natural gas consumed, respectively. These are based on national averages for the natural gas supply chain (Alvarez et al. 2018, Environmental Defense Fund n.d.).

Table 2 Valley Water Natural Gas Usage and GHG Emissions

Year	Natural Gas Usage (Therms)	GHG Emissions ($MTCO_2e$)
2009	134,658	735
2010	138,852	758
2011	122,150	667
2012	145,948	797
2013	126,512	691
2014	104,610	571
2015	107,467	587
2016	103,731	566
2017	117,654	642
2018	144,003	786
2019	136,803	747
2020	140,585	768
2021	143,586	784

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2025; natural gas usage data provided by Valley Water.

On-Road Fleet

Valley Water owns and operates a combination of light and heavy-duty on-road vehicles to transport employees and perform maintenance to its assets, which all consume gasoline. Valley Water provided data on gasoline usage by its on-road vehicle fleet per year, which is presented in Table 3 below, along with associated GHG emissions. GHG emissions, presented as $MTCO_2e$, were calculated by multiplying the total gasoline used each year by an emissions factor of approximately 8.8 kilograms (kg) of CO_2e per gallon (EPA 2023a).

Table 3 Valley Water On-Road Fleet Gasoline Usage and GHG Emissions

Year	Gasoline Usage (Gallons)	GHG Emissions ($MTCO_2e$)
2009	88,834	783
2010	91,533	807
2011	104,874	924
2012	120,412	1,061
2013	137,241	1,209
2014	108,579	957
2015	107,410	947
2016	98,338	867
2017	109,443	964
2018	117,064	1,032
2019	128,693	1,134
2020	132,957	1,172
2021	137,122	1,208

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023; gasoline usage data provided by Valley Water.

Off-Road Fleet

Valley Water owns and operates a variety of construction and other heavy-duty equipment that all combust diesel. Valley Water provided data on diesel usage by its off-road equipment fleet per year, which is presented in Table 4 below, along with their associated GHG emissions. GHG emissions, presented as $MTCO_2e$, were calculated by multiplying the total diesel used each year by an emissions factor of approximately 10.6 kg CO_2e per gallon (California Air Resources Board [CARB] 2023a).

Table 4 Valley Water Off-Road Fleet Diesel Usage and GHG Emissions

Year	Diesel Usage (Gallons)	GHG Emissions ($MTCO_2e$)
2009	48,888	519
2010	37,031	393
2011	43,430	461
2012	16,075	171
2013	57,538	611
2014	40,592	431
2015	52,729	560
2016	62,779	666
2017	81,564	866
2018	52,907	561
2019	66,349	704
2020	71,929	763
2021	58,446	620

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023; diesel usage data provided by Valley Water.

High GWP Gases

Valley Water provided the quantity (in metric tons [MT]), of trifluoroethane (HFC-143A) and Freon (R-407C) refrigerants purchased from 2009 through 2012. These were converted to CO_2e using Intergovernmental Panel on Climate Change's (IPCC) GWP values (IPCC 2022). Results are shown in Table 5 below.

Table 5 Valley Water Fugitive Emissions from Purchased Refrigerants, $MTCO_2e$

Year	HFC-134a ($MTCO_2e$)	R-407C ($MTCO_2e$)	Total GHG Emissions ($MTCO_2e$)
2009	83	28	111
2010	123	0	123
2011	0	28	28
2012	56	0	56

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023; refrigerant purchase data provided by Valley Water.

Facility Electricity Usage

Valley Water provided data on metered electricity usage in megawatt-hours (MWh) in their buildings and facilities by year and utility (i.e., PG&E, PWRPA, and Community Choice Aggregations [CCAs]), along with the associated emissions factors for each. Metered electricity usage from all water treatment plants, the Silicon Valley Advanced Water Purification Center, pumping plants, warehouses, and office buildings operated by Valley Water is included. Thus, inventory results for facility electricity usage include emissions associated with the conveyance and treatment of water within Santa Clara County conducted by Valley Water prior to delivery of water supplies to retailers. To account for transmission losses, electricity usage was scaled upwards by 4.4 percent (EPA 2023b).[4]

Table 6 below shows MWh by provider, along with the associated emissions factors.[5] PWRPA, PG&E, and CCA emissions factors were compiled from The Climate Registry and Power Source Disclosure documents. With respect to CCA usage, a variety of minor Valley Water facilities use CCA-generated electricity which was aggregated into a single account, which altogether use less than one percent of total agency-wide. These minor facilities, according to facility management, either used electricity from SVCE or SJCE. Data disaggregating the energy use between these two CCAs was not readily available, thus emission factors from SJCE were used as a conservative assumption. These energy usage data do not include usage generated by Valley Water-owned solar or hydro sources.

Table 6 Valley Water Building Electricity Usage and Emissions Factors by Utility

	Emissions Factors (lbs CO_2e / MWh)			MWh		
Year	PWRPA	PG&E	CCA[1]	PWRPA	PG&E	CCA
2009	436	575	0	17,023	776	0
2010	275	445	0	17,012	764	0
2011	54	393	0	16,278	832	0
2012	486	445	0	15,555	919	0
2013	598	427	0	16,483	798	0
2014	621	435	N/A	21,579	682	0
2015	609	405	N/A	22,619	154	0
2016	0	29	N/A	21,369	1,397	0
2017	0	22	N/A	23,275	1,456	0
2018	0	206	0	20,731	845	176
2019	0	19	649	22,973	0	186
2020	0	15	190	25,686	1,329	20
2021	0	98	N/A	22,124	1,094	0

Notes: CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; lbs = pounds; $MTCO_2e$ = metric tons of carbon dioxide equivalent; MWh = megawatt-hours. N/A = not applicable
[1] CCA data was aggregated across either San Jose Clean Energy (SJCE) or Silicon Valley Clean Energy (SVCE). SJCE generally has higher emission factors than SVCE, and thus was selected to represent the CCA emission factors as a conservative assumption.
Source: Calculated by Ascent in 2025; electricity usage data provided by Valley Water.

Table 7 below shows a summary of total electricity usage, a weighted average emissions factor, and total emissions. For 2016 and subsequent years, Valley Water was procuring zero-emission power from PWRPA via the Zero Carbon Water portfolio. Because PWRPA represents 94 to 99 percent of Valley Water buildings' electricity usage, depending on the year, total emissions dropped substantially beginning in 2016.

[4] This scaled value represents the quantity of electricity measured at the generator, not at the meter. It is the appropriate value for emissions inventories because it represents the amount of electricity that must be produced to serve the demand of Valley Water. All subsequent references to electric usage in this memorandum refer to this scaled value.

[5] These MWh values shown here only include energy consumption in Valley Water buildings from the listed utilities. They do not include offsetting production from onsite solar photovoltaic panels, or electricity production from the Anderson Dam. Solar panels generate approximately 268 MWh per year, or 1 percent of Valley Water's total annual load of 20,908 MWh; Anderson generates approximately 851 MWh per year, or 4 percent of annual Valley Water load.

Table 7 Valley Water Facility Electricity Usage, Weighted Average Emissions Factors, and GHG Emissions

Year	Electricity Usage (MWh)	Weighted Average Emissions Factor (lb CO_2e / MWh)	GHG Emissions ($MTCO_2e$)
2009	17,799	442	3,568
2010	17,777	282	2,274
2011	17,109	70	545
2012	16,475	484	3,613
2013	17,281	590	4,627
2014	22,261	616	6,218
2015	22,773	607	6,274
2016	22,766	18.0	186
2017	24,732	12.4	139
2018	21,753	8.0	79
2019	23,159	5.2	55
2020	27,035	8.0	99
2021	23,218	4.6	49

Notes: CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; lb = pounds; $MTCO_2e$ = metric tons of carbon dioxide equivalent; MWh = megawatt-hours.
Source: Calculated by Ascent in 2025; electricity usage data provided by Valley Water; excludes Valley Water-owned solar and hydro

Imported Water

Valley Water imports water using two different providers, the SWP and the CVP. Both the SWP and CVP use electricity to pump water from various locations in California to Valley Water's service area. For each of these providers, the inventory approach for calculating the carbon emissions from this pumping is described below.

The SWP is a network of canals, pipelines, reservoirs, and hydroelectric dams with a primary purpose of delivering water (CDWR 2023a). SWP is both a consumer and producer of energy; the energy the SWP uses to pump water comes from a combination of its own emissions-free hydroelectric generation and purchases of power from a combination of renewable sources, non-renewable sources, and on the wholesale market (CDWR 2023b). Thus, the emissions factor for a given year depends on the proportion of non-renewable power in that year. For example, in a drought year when hydroelectric production is low, the SWP would likely produce less energy from its own hydroelectric generation, and more from gas-fired power. Table 8 below shows the calculation of emissions factors for the SWP, compiled from Climate Registry reports (The Climate Registry 2023). The "MWh" shown in the table is the sum of the MWh produced by the SWP's own hydroelectric dams and power purchased from other sources, because both are used to pump water.

Table 8 Calculation of Emissions Factors for SWP Electricity

Year	MWh	$MTCO_2e$	$MTCO_2e$ per MWh
2014	2,796,292	326,432	0.12
2015	3,490,065	582,026	0.17
2016	6,540,308	984,190	0.15
2017	9,580,259	1,361,134	0.14
2018	5,624,903	695,681	0.12
2019	7,555,491	432,487	0.06
2020	3,818,321	250,688	0.07
2021	2,699,049	257,933	0.10

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent; MWh = megawatt-hours.
Source: Calculated by Ascent in 2025; energy usage and emissions factors compiled from The Climate Registry (2023).

The emissions factors in Table 8 above were converted to $MTCO_2e$ per acre-foot of water pumped, using a factor of 1.064 MWh per acre-foot of water extracted and conveyed to Valley Water (CDWR 2023c), and were then applied to total acre-feet imported by Valley Water, with results shown in Table 9 below.

Table 9 Calculation of Emissions from Valley Water SWP Deliveries

Year	Acre-Feet of SWP Water Delivered	Emissions Factor ($MTCO_2e$ per Acre-Foot)	GHG Emissions ($MTCO_2e$)
2014	23,750	0.12	2,950
2015	54,304	0.18	9,636
2016	71,271	0.16	11,411
2017	32,795	0.15	4,958
2018	59,018	0.13	7,766
2019	18,986	0.06	1,156
2020	31,684	0.07	2,213
2021	39,502	0.10	4,017

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2025; imported water data provided by Valley Water.

Unlike SWP, no emissions were associated with water deliveries from CVP. The CVP is complex, multi-purpose network of dams, reservoirs, canals, hydroelectric powerplants and other facilities managed by the U.S. Bureau of Reclamation. These dams generate electricity, and the priority usage of this electricity is for project pumping needs (Delta Vision Task Force 2017: 46), including extraction and conveyance to Valley Water. On an annual basis, energy produced by the CVP dams can range from 2,400,000 to 8,600,000 MWh, whereas the CVP uses between 334,000 to 1,670,000 MWh, depending on the year and hydrological conditions (WAPA 2017). Therefore, on an annual basis, carbon-free hydroelectric energy produced by the CVP far exceeds the needs of its use. Because this energy is first required to serve project pumping needs, it was assumed that the water that the CVP sent to Valley Water is 100 percent carbon-free.

Employee Commute

Valley Water provided data on the total number of full-time employees (FTE) by year, both permanent and temporary, as well as the percentage that telecommuted from 2014 through 2021. For 2014 through 2019, data on telecommute days per week was unavailable, so employees were assumed to telecommute 10 percent of working days. For 2020 and 2021, telecommuting employees were assumed to work from home during 60 percent of working days because of the impacts of the COVID-19 pandemic. Temporary employees were assumed to work 50 percent of the time. A commute was assumed to be 10 miles one-way (the value for average work tour trip distance by automobile), per Plan Bay Area 2050 (Association of Bay Area Governments and Metropolitan Transportation Commission 2021: 125).

These data were matched with the CARB's Emission Factor (EMFAC) model emissions data on $MTCO_2e$ per VMT, which shows a general decline year over year due to increasing fuel mileage, to calculate emissions. Tables 10 and 11 show the results of this analysis, for permanent and temporary employees, respectively. Round-trip miles per workday per employee are expressed as a weighted average across both commuters and telecommuters. These data assume 215 working days per year per Valley Water employee.[6]

Table 10 Permanent Employee Commute Distances and Emissions

Year	Number of FTEs	Percent Telecommuting	Round-Trip Miles per Workday per Employee	Grams CO_2e / VMT	GHG Emissions ($MTCO_2e$)
2010	747	10%	20	408	1,283
2011	698	10%	20	402	1,183
2012	697	10%	20	397	1,167
2013	675	10%	20	387	1,102
2014	665	10%	20	379	1,062
2015	700	10%	20	371	1,095
2016	727	10%	20	360	1,103
2017	733	10%	20	355	1,096
2018	647	10%	20	347	946
2019	710	10%	20	340	1,018
2020	793	60%	20	335	457
2021	884	60%	20	328	498

Notes: CO_2e = carbon dioxide equivalent; FTE = full-time employee; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023; commute data provided by Valley Water.

[6] 215 workdays assumes 52 weeks per year, 5 days per week, less 14 designated holidays, 3 days personal leave, 12 days sick leave, and 16 days of vacation (Valley Water 2023b). 16 days of vacation is assumed to be the amount of vacation for a public sector employee with a tenure of 5 years; this 5-year tenure is assumed because it is the closest value available to the Bureau of Labor Statistics estimate of seven years of median tenure for public sector employees (Bureau of Labor Statistics 2022: 2)

Table 11 Temporary Employee Commute Distances and Emissions

Year	Number of FTEs	Percent Telecommuting	Round-Trip Miles per Workday per Employee	Grams CO_2e / VMT	GHG Emissions ($MTCO_2e$)
2010	77	0%	20	408	134
2011	76	0%	20	402	131
2012	89	0%	20	397	151
2013	137	0%	20	387	228
2014	142	0%	20	379	231
2015	163	0%	20	371	260
2016	167	0%	20	360	259
2017	142	0%	20	355	216
2018	145	0%	20	347	216
2019	113	0%	20	340	165
2020	55	100%	-	335	-
2021	99	100%	-	328	-

Notes: CO_2e = carbon dioxide equivalent; FTE = full-time employee; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023; commute data provided by Valley Water.

As discussed previously, only 2017 through 2019 was used as the basis of the inventory calculation—2020 and 2021 were excluded due to the effects of the COVID-19 pandemic.

Business Travel

Data were provided by Valley Water on reimbursements in dollars for passenger vehicle and plane travel by year for 2018 through 2021. Only 2018 and 2019 were included in the calculation of the baseline average, because 2020 and 2021 were years largely influenced by the COVID-19 pandemic, and thus, not representative of an average year.

For passenger vehicle travel, total VMT were calculated based on Internal Revenue Service reimbursement rates for dollars per mile, generally ranging from 55 to 58 cents per mile. These total VMT were then multiplied by EMFAC emissions per VMT rates, as shown in Table 12 below.

Table 12 Valley Water Business Travel Passenger Vehicle Emissions Calculations

Year	Reimbursement Amount	Miles	Grams CO_2e / VMT	GHG Emissions ($MTCO_2e$)
2018	$36,062	66,168	347	23
2019	$129,948	224,048	340	76

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled.
Source: Calculated by Ascent in 2023; reimbursement data provided by Valley Water.

For airplane travel, passenger-miles were estimated from the reimbursement amounts, assuming approximately 19 cents of airline revenue per passenger-mile (BTS 2023). These passenger-miles were then converted to aviation gasoline combusted assuming 53.62 passenger-miles per gross gallon equivalent of aviation gasoline, which was in turn converted to CO_2e assuming 8.34 kg of CO_2e per gallon (AFDC 2022; EPA 2023a). Table 13 below shows the results of this analysis.

Table 13 Valley Water Business Travel Airplane Travel Emissions Calculations

Year	Reimbursement Amount	Passenger Miles	Gallons of Aviation Gasoline	GHG Emissions ($MTCO_2e$)
2018	$52,150	281,431	5,249	44
2019	$180,835	971,359	18,116	151

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023; reimbursement data provided by Valley Water.

Construction

Construction emissions, summarized in Table 14 below, were compiled by Valley Water from CEQA documents prepared for each construction project. Construction projects can last for multiple years, and the projects' total emissions were distributed on an equal per-year basis across the project's duration. For example, if a project began in 2010 and ended in 2012 and emitted a total of 600 $MTCO_2e$, an amount of 200 MT was assigned to each of the three construction years (i.e., 2010, 2011, and 2012).

Table 14 Valley Water Construction GHG Emissions

Year	GHG Emissions ($MTCO_2e$)
2010	618
2011	5,149
2012	3,917
2013	3,979
2014	4,102
2015	4,266
2016	4,969
2017	5,856
2018	6,638
2019	8,108
2020	7,228
2021	7,123

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023.

Solid Waste

Emissions from solid waste disposed by Valley Water employees were calculated using Equation SW 4.1 (Methane Emissions from Solid Waste) from the Community Protocol. This equation uses the following as inputs: 1) total mass of waste entering the landfill, 2) landfill gas efficiency collection, and 3) an emission factor for materials in terms of MT of CH_4 per wet short ton.[7] It was assumed that the landfill gas was collected with 75 percent efficiency at the Kirby Canyon landfill, and that the waste is mixed solid waste with 0.06 MT of CH_4 emissions per wet short ton (Waste Management 2023; ICLEI 2019). Employees were assumed to produce 10.53 pounds of mixed solid waste per full-time employee per workday (CalRecycle 2019), assuming 215 workdays in a year.[8] Of this 10.53 pounds, 40 percent is

[7] In this case, a wet short ton includes the weight of the waste itself and any water that it has been soaked or suspended in. This is in contrast to a dry short ton, which only includes the weight of the waste.
[8] Telecommuting employees were assumed to have the same waste production as on-site employees.

assumed to be recycled (CalRecycle 2023), and thus cause no emissions. The other 60 percent is assumed to be landfilled and cause methane emissions. Results are shown in Table 15 below.

Table 15 Valley Water Solid Waste GHG Emissions

Year	GHG Emissions ($MTCO_2e$)
2010	225
2011	211
2012	215
2013	222
2014	221
2015	236
2016	244
2017	239
2018	216
2019	225
2020	232
2021	268

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023.

Wastewater

Emissions from wastewater generated by Valley Water facilities were calculated based on average population-generated wastewater rates using Valley Water's historical FTE numbers and the following equations from the Community Protocol based on treatment processes at San José-Santa Clara Regional Wastewater Facility, which serves Valley Water:

- WW.1(alt): Stationary Methane Emissions from Combustion of Digester Gas,
- WW.2(alt): Stationary Nitrous Oxide Emissions from Combustion of Digester Gas,
- WW.7: Process Nitrous Oxide Emissions from Wastewater Treatment Plants with Nitrification and Denitrification, and
- WW.12(alt): N_2O Emission from Effluent Conversion when only Population Served by Wastewater Treatment Plant is Known (ICLEI 2019).

These equations characterize the emissions from the various steps of the wastewater treatment processes at the San José-Santa Clara Regional Wastewater Facility, which converts digester gas generated from the anaerobic digestion waste to energy used on site and also employs a nitrification and denitrification process (Yigzaw 2015, City of San Jose 2017). Results are shown below in Table 16.

Table 16 Valley Water Wastewater GHG Emissions

Year	Methane from combustion of digester gas ($MTCO_2e$) (WW.1.(Alt))	N_2O from combustion of digester gas ($MTCO_2e$) (WW.2.(Alt))	N_2O emissions from nitrification/ denitrification ($MTCO_2e$) (WW.7)	N_2O from effluent (discharged to river/estuary) ($MTCO_2e$) (WW.12(Alt))	GHG Emissions ($MTCO_2e$)
2010	0.02	0.03	1.97	6.18	8.20
2011	0.02	0.03	1.85	5.81	7.70
2012	0.02	0.03	1.88	5.90	7.82
2013	0.02	0.03	1.94	6.10	8.09
2014	0.02	0.03	1.93	6.06	8.04
2015	0.02	0.04	2.06	6.48	8.60
2016	0.02	0.04	2.14	6.71	8.90
2017	0.02	0.04	2.09	6.56	8.71
2018	0.02	0.03	1.89	5.94	7.88
2019	0.02	0.03	1.97	6.18	8.20
2020	0.02	0.04	2.02	6.36	8.44
2021	0.02	0.04	2.35	7.38	9.79

Notes: GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculated by Ascent in 2023.

Sediment Hauling

Valley Water provided data on tons of sediment hauled by the Stream Maintenance Program (SMP) from 2018-2021. As part of SMP operations, accumulated sediment in streams throughout Santa Clara County is excavated and hauled off-site to maintain conveyance capacity in stream channels. Each dump truck hauling this waste was assumed to be a 5-axle truck trailer, which can carry a payload of 34,760 pounds, or 15.8 metric tons (Federal Highway Administration 2000: 9). CO_2e per dump truck VMT and VMT per trip values for dump trucks were derived from EMFAC (using the T7 Single Dump Class 8 EMFAC vehicle category), and used to calculate emissions as shown in Table 17 below.

Table 17 Valley Water Sediment Hauling Tonnages and GHG Emissions

Year	Total Sediment Hauled (MT)	Sediment Hauled Per Load (MT)	Number of Loads Hauled	Grams $MTCO_2e$ Per Dump Truck VMT	Round-Trip Truck Miles Traveled Per Load	GHG Emissions ($MTCO_2e$)
2018	21,042	15.8	1,335	1,822	11.4	28
2019	52,071	15.8	3,303	1,820	13.3	80
2020	59,317	15.8	3,762	1,814	13.7	93
2021	30,472	15.8	1,933	1,815	13.5	48

Notes: GHG = greenhouse gas; MT = metric tons; $MTCO_2e$ = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled.
Source: Sediment tonnages provided by Valley Water; calculated by Ascent in 2023.

1.5 SUMMARY OF 2017-2021 BASELINE INVENTORY RESULTS

Average emissions from 2017-2021 for the individual sectors described above were summed to calculate total annual GHG emissions. On average, over the baseline years, Valley Water's emissions were 15,399 MT CO_2e per year. Results are summarized for all sectors and by scope in Table 18 below.

Table 18 2017-2021 Valley Water GHG Emissions Inventory by Scope and Sector

Scope	Sector	Average GHG Emissions ($MTCO_2e$)	Percent of Total
1	On-Road Fleet	1,102	7.2%
	Natural Gas Use in Buildings	745	4.8%
	Off-Road Fleet	703	4.6%
	High GWP Gases	79	0.5%
	Scope 1 Total	**2,630**	**17.1%**
2	Facility Electricity Use	20	0.1%
	Scope 2 Total	**20**	**0.1%**
3	Construction	6,990	45.4%
	Imported Water	4,022	26.1%
	Employee Commute	1,219	7.9%
	Solid Waste	236	1.5%
	Business Travel	147	1.0%
	Sediment Hauling	62	0.4%
	Wastewater	9	0.1%
	Scope 3 Total	**12,686**	**82.4%**
Total		**15,399**	**100.0%**

Notes: Totals may not sum exactly due to independent rounding. GHG = greenhouse gas; GWP = global warming potential; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Prepared and calculated by Ascent in 2025.

2 GHG EMISSIONS FORECASTS

The following section presents results for two sets of forecasts for years 2030 and 2045, the BAU scenario and the legislative-adjusted BAU (legislative-adjusted) scenario. These forecasts provide Valley Water with information needed to focus efforts on certain emissions sectors and sources that have the greatest opportunities for GHG emissions reductions. It is important to note that the legislative-adjusted forecasts only account for emissions reductions associated with adopted policies and regulations; they do not account for goals established by regional, State, and federal agencies or executive orders outside of adopted legislation and regulations.

2.1 METHODOLOGY FOR ACTIVITY FORECASTING

To calculate future activity levels for a given sector, one of the following four forecasting methods was used, depending on sector attributes and available data. Methods are ranked below in order of preference; i.e., for each sector, the first method was preferred and used if possible. If that was not appropriate, the second method was used, and if that was not appropriate, the third was used, etc.

Method 1: Use Publicly Available Forecast. If a forecast of activity level was already publicly available, that forecast was incorporated into this analysis. Emissions from construction and imported water were forecasted using Method 1. For construction, Valley Water's Five-Year Capital Improvement Program (CIP) contained a list of upcoming captual projects anticipated to begin by 2028 (Valley Water 2023a)—emissions from these projects were included. For imported water, the Valley Water Supply Master Plan contains a forecast of acre-feet of imported water through 2040 (Valley Water 2019: 10).

Method 2: Consult with Valley Water Operations Facilities Staff Experts. For sectors where Method 1 could not be used, Valley Water Operations facilities staff experts with detailed operational knowledge were consulted on forecasts of activity levels for 2030 and 2045. Emission from on-road fleet and off-road fleet were forecasted using Method 2.

Method 3: Use Average from Baseline Years. For sectors where Method 1 or Method 2 could not be used, a historical average was calculated and assumed to apply to forecast years. Emissions from sediment hauling, business travel, high GWP gases, natural gas use in buildings, employee commute, solid waste, and wastewater were forecasted using Method 3. Sediment hauling and business travel do not have enough years of data to meaningfully calculate trends (4 and 2 years, respectively). High GWP gas purchases are intermittent (i.e., not purchased on any particular time cycle) and thus cannot be precisely forecast. Natural gas usage had no meaningful relationship with year; regression analysis of usage on year resulted in an R-squared value of 0.02.[9] Solid waste, employee commute, and wastewater are all functions of FTE, which is expected to remain at current levels (i.e. there are currently no plans to expand the size of Valley Water's existing workforce).

Method 4: Use Maximum from Baseline Years. This method was used to forecast emissions from facility electricity usage. Valley Water does not anticipate substantial expansion of existing facilities or construction of new facilities that would increase operational electricity usage, so a linear increase from historical trends was deemed inappropriate. Furthermore, since the baseline period encompasses COVID years of 2020-2021, in which energy use dropped substantially, an average would likely understate the true future amount of energy used. Therefore, a maximum was considered appropriate for forecasting both the BAU and legislative-adjusted cases.

Table 19 below summarizes the forecasting approach by sector.

Table 19 Forecasting Approach by Sector

Forecasting Approach	Activity
Publicly Available Forecast	Construction
Publicly Available Forecast	Imported Water
Consult with Staff Experts	On-Road Fleet
Consult with Staff Experts	Off-Road Fleet
Use Baseline Year Average	Natural Gas Use in Buildings
Use Baseline Year Average	High GWP Gases
Use Baseline Year Average	Employee Commute
Use Baseline Year Average	Business Travel
Use Baseline Year Average	Solid Waste
Use Baseline Year Average	Wastewater
Use Baseline Year Average	Sediment Hauling
Use Baseline Year Maximum	Facility Electricity Usage

9 R-squared indicates the percent of variation in the dependent variable (activity level) that is due to variation the independent variables (year). In this case, a low R-squared indicates that year is a poor predictor of activity level (i.e., no clear trend in activity level year over year), and a high R-squared indicates that year is a good predictor of activity level (clear trend year over year).

2.2 LEGISLATIVE ADJUSTMENTS

Legislative adjustments were applied to the emission factors for the following sectors: on-road fleet, employee commute, business travel, sediment hauling, building electricity, and imported water. Table 20 below summarizes these adjustments. Legislative adjustments were not applied to facility electricity usage because Valley Water already procures energy from the Zero Carbon Water portfolio—thus, further reductions are not possible.

Table 20 Legislative Reductions Summary

Sector	Legislative Reduction	Description	Emissions Factors Affected
On-Road Fleet (Light-Duty)	Advanced Clean Car Standards II	Establishes targets for all new passenger cars, trucks, and SUVs sold in California to be zero-emission or plug-in hybrid vehicles by 2035.	Grams CO_2e / VMT
Construction			
Employee Commute			
Business Travel (Passenger Cars Only)			
On-Road Fleet (Heavy-Duty)	Advanced Clean Fleets	Establishes ZEV milestone targets for vehicles with a GVWR above 8,500 pounds in public fleets, such as Valley Water's. Valley Water-owned vehicles, as well as contracted vehicles for construction projects, are assumed to belong to Milestone Groups 1, 2, and 3, because these groups encompasses heavy—duty and specialized vehicles that Valley Water needs to build and perform maintenance of its system. Group 1 has a target of 50% ZEVs by 2031, and 100% by 2035. Group 2 has a target of 25% ZEVs by 2030, and 100% ZEVs by 2039. Group 3 has a target of 10% ZEVs by 2030 and 100% ZEVs by 2042 (CARB 2023b).	
Construction			
Sediment Hauling			
Building Electricity	Senate Bill 100	Requires that renewable energy and zero-carbon resources supply 100% of electric retail sales to end-use customers by 2045.	CO_2e / kWh
Imported Water from SWP	Senate Bill 1020	Requires that 100% renewable electricity is procured to serve all state agencies by December 31, 2035.	Grams CO_2e / Acre-Feet Water

Notes: CO_2e = carbon dioxide equivalent; GVWR = gross vehicle weight rating; kWh = kilowatt-hours; SUV = sport utility vehicle; VMT = vehicle miles traveled; ZEV = Zero Emission Vehicle; SWP = State Water Project
Source: Prepared by Ascent in 2025.

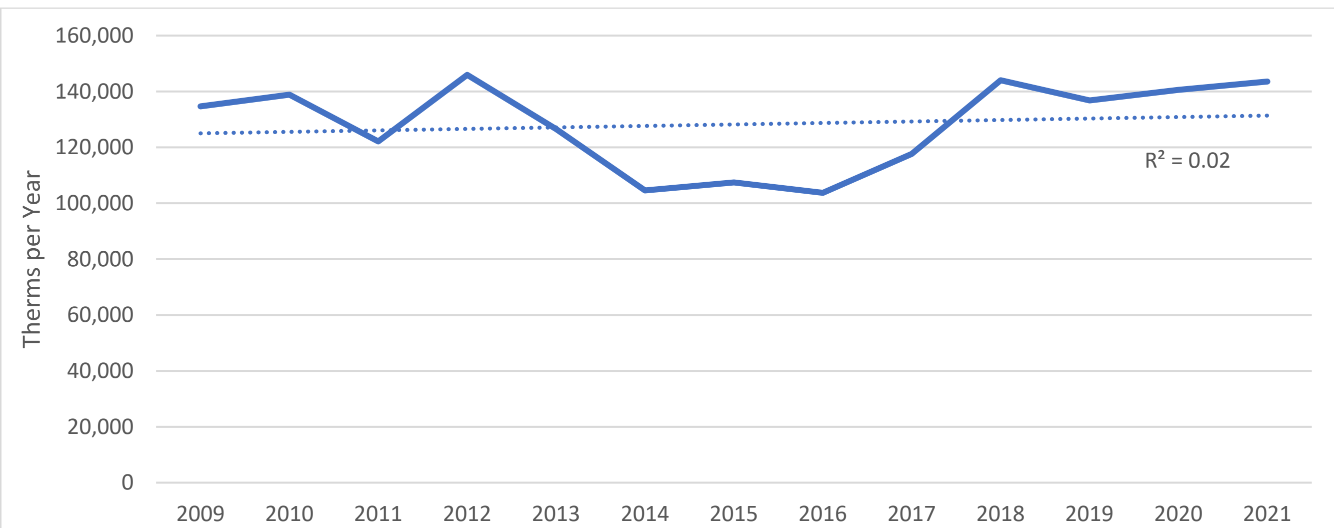
Note that in January 2025, CARB rescinded its application for a Clean Air Act waiver for its Advanced Clean Fleets (ACF) Regulation. The regulation would have allowed CARB to regulate medium- and heavy-duty truck fleets across the state to achieve more stringent zero-emission targets that are not required under the federal regulations. While ACF no longer applies to private fleet operators, until CARB decides to apply for the waiver again, it will still apply to state and local fleets (Association of California Water Agencies 2025). Thus, as a local government agency, Valley Water's fleet is subject to ACF.

Additionally, although ACCII and ACF have ambitious ZEV targets, the emissions forecasts that account for these regulations are subject to the availability of supporting infrastructure and vehicle technology. With respect to Valley Water's fleet, Valley Water is both obligated and mandated to meet ACF rules, despite any uncertainty about available necessary technology. Both ACCII and ACF regulations were developed by the State with the feasibility and availability of the vehicle technology and supporting infrastructure in mind. Future updates to the GHGRP will allow Valley Water to refine these forecasts; however, at present, the emission forecasts in this document assume the successful implementation of these two regulations.

2.3 FORECAST RESULTS

Natural Gas Use in Buildings

As shown in Figure 2 below, natural gas usage in Valley Water's buildings has had no meaningful upward or downward trend over time. The R-squared value that resulted when regressing therms per year on year was 0.02, and the dotted line shows the regression line.



Source: Natural gas usage data provided by Valley Water; calculations performed by Ascent in 2023.

Figure 2 Historical Natural Gas Usage in Valley Water Buildings

Because there was no meaningful trend, an average usage in the baseline years of 136,526 therms per year was assumed to carry forward to future years, resulting in emissions shown in Table 21 below. This assumption was confirmed with Valley Water facility staff (Chesonis et al, pers. comm, 2023). Results for the legislative-adjusted and BAU scenarios are identical because there are no known legislative adjustments for natural gas use in existing buildings.[10] In this (and all subsequent tables), "baseline" refers to an average from 2017-2021.

[10] Building Energy Efficiency Standards (also known as the Energy Code) developed by the California Energy Commission (CEC) only apply to newly constructed buildings, additions to existing buildings, and alterations to existing buildings (CEC 2022). Thus, these were not applied to Valley Water's existing buildings.

Table 21 Baseline and Forecasted Natural Gas Usage and GHG Emissions in Valley Water Buildings

Year	Therms per Year	BAU GHG Emissions ($MTCO_2e$)	Legislative-Adjusted GHG Emissions ($MTCO_2e$)	BAU Percent Change from Baseline	Legislative-Adjusted Percent Change from Baseline
Baseline	136,526	725	725	0%	0%
2030	136,526	725	725	0%	0%
2045	136,526	725	725	0%	0%

Notes: BAU = business as usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent. Baseline refers to an average from 2017-2021.
Source: Calculated by Ascent in 2025.

On-Road Fleet

For the BAU forecast for Valley Water's on-road fleet, based on the expert judgment of the Valley Water facilities management staff, it was assumed that gasoline usage would increase 10 percent over the baseline year average by 2030, and 25 percent over the baseline year average by 2045 (Chesonis et al, pers. comm, 2023). To calculate emissions for the BAU case, an emissions factor from EMFAC was applied to the amount of future gallons forecasted. This resulted in 137,561 gallons of gasoline and 1,212 metric tons of MT CO_2e in 2030, and 156,320 gallons of gasoline and 1,378 metric tons of MT CO_2e in 2045.

For the legislative-adjusted scenario, the emissions factors of vehicles below 8,500 pounds of gross vehicle weight were adjusted to be consistent with ZEV targets in the Advanced Clean Cars II (ACC2) regulation, and the emissions factors of larger vehicles were adjusted per ACF, as detailed in Table 20. It was assumed that Valley Water would continue to purchase carbon-free power from PWRPA to charge electric vehicles, so no emissions would be added from grid electricity by charging these vehicles. Both of these adjustments resulted in a lower consumption of gasoline than in the BAU case. Table 22 below shows a summary of adjustments applied.

Table 22 Valley Water On-Road Fleet VMT and Legislative Adjustments Applied

EMFAC Type	Definition	Legislative Adjustment	VMT per Year
LDA	Passenger Cars	ACC2	82,378
LDT1	Light-Duty Trucks	ACC2	305,708
LDT2	Light-Duty Trucks	ACF (Group 1)	4,960
MDV	Medium-Duty Trucks	ACF (Group 1)	381,647
LHD1	Light-Heavy-Duty Trucks	ACF (Group 2)	251,575
LHD2	Light-Heavy-Duty Trucks	ACF (Group 2)	143,706
T6TS	Medium-Heavy Duty Trucks	ACF (Group 3)	49,324
Total			1,219,297

Notes: EMFAC = EMissions FActor model; ACC2 = Advanced Clean Cars II; ACF = Advanced Clean Fleets; VMT = Vehicle Miles Traveled. Groups based on ACF milestone targets for various heavy-duty truck sectors.
Source: EMFAC types from CARB (CARB 2021); VMT data provided by Valley Water; calculations performed by Ascent in 2023.

These adjustments resulted in the Valley Water fleetwide grams CO_2e per VMT emissions factor decreasing from the BAU value of 622 grams per mile to 478 grams per mile in 2030 (a reduction of approximately 25 percent below 2019 levels), and to 47 grams per mile in 2045 (a reduction of approximately 93 percent). Table 23 below shows this calculation in more detail.[11]

Table 23 Effects of ACC2 and ACF on On-road Emissions Factors

EMFAC type	BAU Emission Factors (Grams CO_2e / VMT)			Legislative-Adjusted Emission Factors (Grams CO_2e / VMT)			Percent Change in Legislative-Adjusted Emissions Factor, Compared to BAU		
	2019	2030	2045	2019	2030	2045	2019	2030	2045
LDA	292	292	292	292	182	23	0%	-37%	-92%
LDT1	366	366	366	366	287	85	0%	-22%	-77%
LDT2	392	392	392	392	286	84	0%	-27%	-79%
MDV	475	475	475	475	356	0	0%	-32%	-84%
LHD1	887	887	887	887	666	0	0%	-25%	-100%
LHD2	930	930	930	930	697	0	0%	-25%	-100%
T6TS	1,943	1,943	1,943	1,943	1,749	0	0%	-10%	-100%
Fleetwide Average	622	622	622	622	478	26	0%	-23%	-96%

Note: ACC2 = Advanced Clean Cars II, ACF = Advanced Clean Fleets, EMFAC = EMissions FActor model; BAU = Business As Usual; VMT = Vehicle Miles Traveled; $MTCO_2e$ = metric tons of carbon dioxide equivalent. Values may not sum due to rounding.
Source: Calculations performed by Ascent in 2023.

These lower emissions factors imply lower gasoline consumption in the legislative-adjusted case. Table 24 below summarizes total forecast emissions in the BAU case and with legislative adjustment, compared to the baseline average.

Table 24 Forecasted On-road Vehicle GHG Emissions for Valley Water Fleet

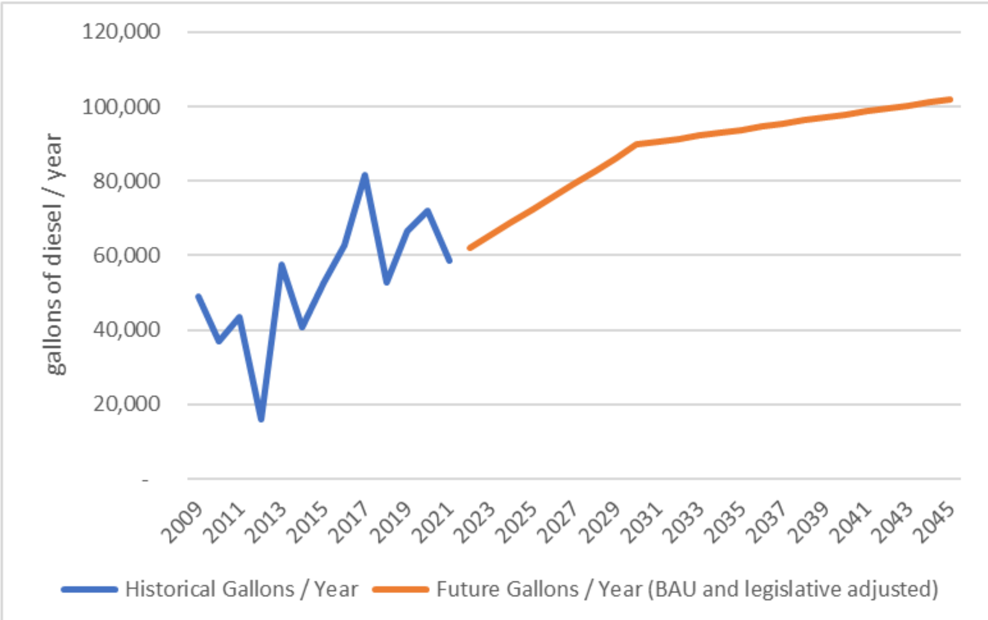
Year	BAU GHG Emissions ($MTCO_2e$)	Legislative-Adjusted GHG Emissions ($MTCO_2e$)	BAU Percent Change from Baseline	Legislative-Adjusted Percent Change from Baseline
Baseline	1,102	1,102	0%	0%
2030	1,212	933	10%	-15%
2045	1,378	58	25%	-95%

Notes: BAU = business as usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculations performed by Ascent in 2023.

Off-Road Fleet

For the BAU forecast for Valley Water's off-road fleet, based on the expert judgment of the Valley Water facilities management staff, it was assumed that diesel usage would increase 10 percent over the 2017-2021 baseline maximum by 2030, and 25 percent over that maximum by 2045 (Chesonis et al, pers. comm, 2023). No legislative adjustments were applied because Valley Water's off-road fleet is largely construction equipment, for which there is no current mandate for a transition to electric power. Note that ACF and ACCII apply to on-road vehicles only. Figure 3 below shows the forecast for off-road vehicles.

[11] 2019 grams CO_2e / VMT values were calculated using the EMFAC database, and are used as a proxy for Valley Water vehicle emissions factors in the baseline years of 2017-2021 (2019 is the "midpoint" year of this range).



Source: Gallons of diesel data provided by Valley Water; calculations performed by Ascent in 2023.

Figure 3 Valley Water Historical and Forecasted Off-Road Fleet Diesel Usage

This usage resulted in the emissions shown in Table 25 below.

Table 25 Forecasted Off-road Vehicle GHG Emissions for Valley Water Fleet

Year	BAU GHG Emissions ($MTCO_2e$)	Legislative-Adjusted GHG Emissions ($MTCO_2e$)	BAU Percent Change from Baseline	Legislative-Adjusted Percent Change from Baseline
Baseline	703	703	0%	0%
2030	952	952	35%	35%
2045	1082	1082	54%	54%

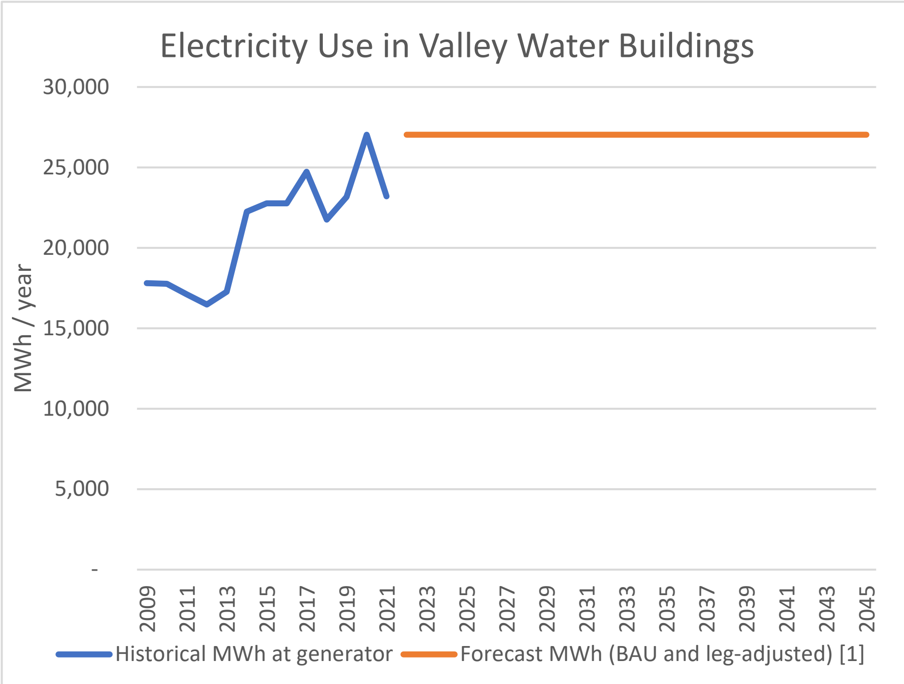
Notes: BAU = business as usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculations performed by Ascent in 2023.

High GWP Gases

High GWP gas purchases are intermittent and trends cannot be predicted with certainty; therefore, it was assumed that at some unknown future year, Valley Water would purchase more refrigerants. Thus, this historical average 2009-2012 level of 79 $MTCO_2e$ per year was assumed to apply to 2030 and 2045, in both the BAU and legislative-adjusted case.

Facility Electricity Usage

Figure 4 below shows the forecast of electricity usage in Valley Water facilities (27,035 MWh), based on the maximum across the baseline years (Chesonis et al, pers. comm, 2023). Unlike the natural gas forecasts which were based on historical averages, future electricity demand is expected to be higher than historical levels with increased electrification of facilitates (i.e. conversion of natural gas equipment to electric) and EV charging. In general, electricity use at VW has been increasing, even with the exclusion of COVID-impacted years. Additionally, electric end uses, including pumping, are fundamentally different than natural gas, which are primarily used for space and water heating.



Note: BAU = Business-as-usual; MWh = megawatt-hours.

Source: Electric usage data provided by Valley Water; calculations performed by Ascent in 2025.

Figure 4 Historical and Forecasted Electricity Usage in Valley Water Facilities

An annual usage of 27,035 MWh was used to forecast both the BAU and legislative-adjusted emissions from electricity. For BAU emissions, a weighted average emissions factor in baseline years 2017-2021 was calculated to be approximately 2 pounds of CO_2e per MWh. For legislative-adjusted emissions in 2030, it was assumed that the non-PWRPA portion of Valley Water's power portfolio (representing approximately 4 percent of the total load) decreased at a rate that would allow it to achieve carbon neutrality by 2045. For legislative-adjusted emissions in 2045, emissions were assumed to be zero commensurate with the carbon neutrality goals in SB 100. Results are shown in Table 26 below.

Table 26 Forecast Emissions Results from Facility Electricity Usage

Year	MWh	BAU GHG Emissions ($MTCO_2e$)	Legislative-Adjusted GHG Emissions ($MTCO_2e$)	MWh percent change relative to baseline	BAU GHG Emissions ($MTCO_2e$) percent change relative to baseline	Legislative-Adjusted GHG Emissions ($MTCO_2e$) percent change relative to baseline
Baseline	23,979	84	84	0%	0%	0%
2030	27,035	95	93	13%	13%	11%
2045	27,035	95	0	13%	13%	-100%

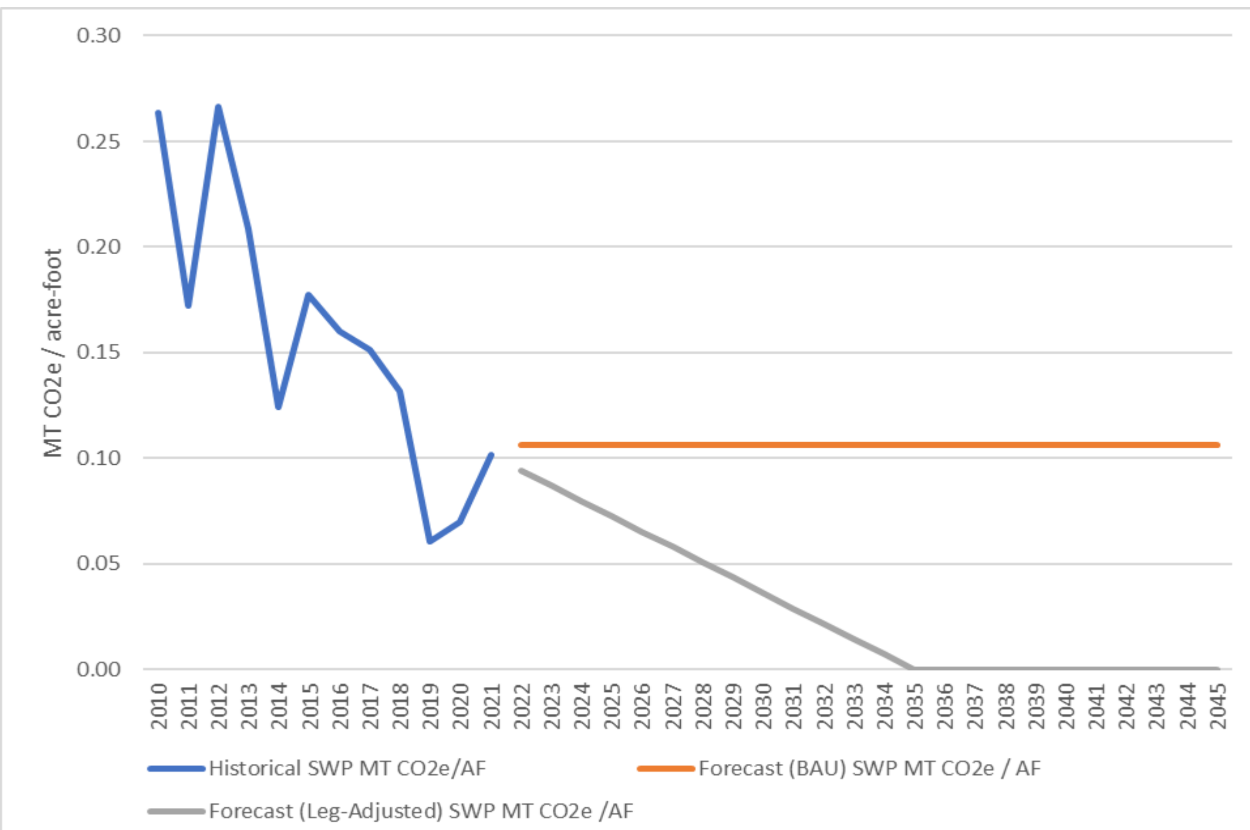
Notes: BAU = business as usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Electric usage data provided by Valley Water; calculations performed by Ascent in 2025.

As discussed in Section 1.4, Valley Water's electricity usage reflects the energy required to operate its water conveyance and treatment systems, which distributes local and imported water to retailers in Santa Clara County. Given that Valley Water currently procures and will continue to procure nearly all of its electricity from PWRPA's carbon free plan, future changes in water demand are not anticipated to significantly affect GHG emissions. Forecasted Scope 3 emissions from imported water are discussed below.

Imported Water

As described in the Water Supply Master Plan, Valley Water's deliveries of imported water are anticipated to continue fluctuate annually and decline relative to historical deliveries. Imported water delivery forecasts of 131,000 acre-feet in 2030 and 132,000 acre-feet in 2040 (extrapolated to 132,500 acre-feet in 2045) are based on the Water Supply Master Plan 2040 (Valley Water 2019: 10). Based on data on historical shares from the 2017-2021 baseline period, 29 percent of the imported water was delivered from SWP and 71 percent from CVP. Using these delivery forecasts and applying the historical average shares of delivered CVP and SWP water, the forecast conservatively estimates future imported water emissions by assuming that approximately 49,000 acre-feet of SWP and 82,000 acre-feet of CVP water will be delivered in each year through 2045.

For SWP, in the BAU case, emissions were calculated using an emissions factor of 0.11 $MTCO_2e$ per acre-foot of water, which represents an acre-foot weighted average in the baseline years. For the legislative-adjusted case, SWP emissions were adjusted to account for SB 1020, which mandates 100 percent renewable electricity procurement for state agencies (including DWR) by December 31, 2035. A legislative-adjusted emissions factor for 2030 (approximately 0.036 $MTCO_2e$ per acre-foot of water) was calculated by linearly interpolating between the 2021 emissions factor (the latest available year of data) and the SB 1020 target of zero emissions by 2035, as shown in Figure 5 below.



Notes: AG = Acre-feet; BAU = Business-as-usual; $MTCO_2e$ = metric tons of carbon dioxide equivalent; SWP = State Water Project.

Source: Calculations performed by Ascent in 2023.

Figure 5 State Water Project Emissions Historical and Forecasted Emissions Factors

The resultant acre-feet forecasts, emissions factors, and emissions are shown in Table 27 below.

Table 27 Forecasted Acre-Feet, Emissions Factors, and GHG Emissions for SWP and CVP Imported Water

Importer	Year	Acre-feet imported	BAU Emissions Factors ($MTCO_2e$ / Acre-Feet)	Legislative-Adjusted Emissions Factors ($MTCO_2e$ / Acre-Feet)	BAU GHG Emissions ($MTCO_2e$)	Legislative-Adjusted GHG Emissions ($MTCO_2e$)	BAU GHG Emissions percent change from baseline	Leg - adjusted GHG emissions percent change from baseline
SWP	Baseline	36,397	0.106	0.106	4,022	4,022	0%	0%
SWP	2030	37,772	0.106	0.036	4,174	1,372	4%	-66%
SWP	2045	38,205	0.106	0	4,222	0	5%	-100%
CVP	Baseline	89,833	0	0	0	0	0%	0%
CVP	2030	93,228	0	0	0	0	0%	0%
CVP	2045	94,295	0	0	0	0	0%	0%

Notes: BAU = business as usual; CVP = Central Valley Project; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; SWP = State Water Project.
Source: Calculations performed by Ascent in 2025.

Employee Commute

Employee commute distances were assumed to remain at 10 miles per one-way commute, per section 1.4. The number of FTE was assumed to remain at the average of 2017-2021, or 864 FTE. However, in contrast to the previous telecommute policy of one day at home and four days onsite, the forecast assumes Valley Water's new policy of two days per workweek of telecommute and three days onsite (Valley Water 2023c: 5) is implemented for all future years, for both temporary and full-time employees; this results in a decrease in VMT relative to the baseline years. Additionally, it is assumed that 60 percent of Valley Water staff (i.e., the amount of staff telecommuting in the COVID years of 2020 and 2021), both full-time regular and temporary, continue to telecommute in future.

BAU emissions factors were calculated as a VMT-weighted average across these years, and legislative-adjusted emissions factors were calculated accounting for increasing electric car adoption under ACC2. As an approximation, electric cars were assumed to have zero emissions by 2030, based on utility plans submitted by the electricity providers that serve the energy load in Santa Clara County: San Jose Clean Energy, Silicon Valley Clean Energy, and PG&E. These providers' power is forecasted to be 100, 95, and 89 percent carbon-free by 2030, respectively (San Jose Clean Energy 2022; Silicon Valley Clean Energy 2022; Pacific Gas and Electric 2022). Information on which of these three utilities a Valley Water employee might use to charge their car is speculative, so a more precise calculation of emissions factors from electric car charging was not possible. However, because these carbon values all result in zero or relatively low emissions factors,[12] the impact on total emissions was considered negligible and not included in the calculation.

Table 28 below shows the resultant forecast from these assumptions.

[12] For example, in the worst-case emissions factor per kWh scenario of the listed utilities (PG&E at 89 percent carbon-free and therefore 11 percent carbon-emitting), assuming that a natural gas generator emits 0.428 $MTCO_2e$ per MWh (CARB 2018: 16), a given kWh of energy would have approximately 0.11 * 0.428 = 0.05 MT CO_2e associated with its production. Assuming that an electric car has a fuel efficiency of 3 miles per kWh (INL n.d.), the resultant emissions are approximately 16 grams of CO_2e per VMT, or less than one-tenth of the 2030 legislative adjusted result of 231 grams of CO_2e per VMT.

Table 28 Forecasted Employee Commute VMT, Emissions Factors, and GHG Emissions

Year	BAU g CO_2e / VMT	Leg-adjusted g CO_2e/VMT	Future VMT (not counting COVID years)	MT CO_2e BAU	MT CO_2e Leg-adjusted	BAU emissions - percent change from baseline	Leg - adjusted emissions - percent change from baseline
Baseline	348	348	3,507,653	1,219	1,219	0%	0%
2030	348	231	2,822,898	981	651	-20%	-47%
2045	348	46	2,822,898	981	129	-20%	-89%

Notes: BAU = business-as-usual; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled.
Source: VMT data provided by Valley Water; calculations performed by Ascent in 2023.

Business Travel

For airplane travel, emissions were assumed to be the same as the baseline average for both the BAU and legislative-adjusted scenarios, as there are no legislative adjustments affecting the aviation sector. For passenger vehicle travel, emissions were adjusted downwards to account for the effects of ACC2. For passenger vehicle travel using EVs, emissions are assumed to be zero based on the relatively negligible contribution from upstream electricity generation in future years, consistent with the assumptions for Employee Commute. Table 29 shows the results of those adjustments.

Table 29 Forecasted Emissions from Passenger Car Travel, BAU and legislative-adjusted.

Year	BAU g CO_2e/VMT	ACC2 g CO_2e/VMT for light-duty vehicles	VMT	BAU MT CO_2e	ACC2 MT CO_2e	BAU emissions percent change from baseline	Legislative-adjusted emissions percent change from baseline
Baseline	339	339	146,320	50	50	0%	0%
2030	339	231	146,320	50	34	0%	-32%
2045	339	46	146,320	50	7	0%	-87%

Notes: CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled.
Source: VMT data provided by Valley Water; calculations performed by Ascent in 2025.

Construction

The following considerations were taken into account when forecasting BAU construction emissions. First, both forecast years (2030 and 2045) are past the end of the forecast horizon of the Capital Improvement Plan, which only extends to 2028. Therefore, it was not possible to forecast with certainty the full set of construction projects that would occur in 2030 and 2045, although some projects are forecast to be ongoing in 2030. Second, construction investments are intermittent and thus vary substantially from year to year.

Given these considerations, total emissions in future years were calculated as the sum of 1) average annual emissions from 2011 to 2028[13] for all projects that end before 2030, and 2) 2030 emissions from projects that will be active during that year. 1) represents an estimate of emissions from "unknown" projects that could be built in 2030, but are not yet known because 2030 is beyond the end of the Capital Improvement Plan's forecast horizon. 2) represents known projects that will have emissions in 2030. The sum of unknown and known project emissions yields an estimate of the total.

Table 30 below shows the calculation of total emissions from construction per the approach above, resulting in a projected annual emissions of 8,115 $MTCO_2e$ per year for 2030 and 2045. The table is based on data from CEQA documents provided by Valley Water (as described in Section 1). The emissions value was assumed to be the same in 2030 and 2045, as currently there are no forecasts of Valley Water construction activity that extend to 2045, and thus no basis for assuming different values in 2030 and 2045.

[13] 2011 and 2028 were selected as the span of years for the average, because they capture the greatest number of years of available data. This approach was chosen to account for the substantial year-over-year variation in emissions mentioned above.

Table 30 BAU Construction Emissions Forecasting for 2030 and 2045, MT CO_2e

Project Name	Ongoing in 2030?	Years Used for Average	Annual Average Emissions, MT CO_2e
Palo Alto Flood Basin Tide Gate Structure Replacement Project	Yes	2030	161
Almaden Lake Improvement Project	Yes	2030	541
Sunnyvale East and West Channels Flood Protection Project	Yes	2030	160
Stream Maintenance Program	Yes	2030	3,917
South Bay Advanced Recycled Water Treatment Facility	No	2011 - 2028	34
Lower Berryessa Creek Program	No	2011 - 2028	252
Rinconada Water Treatment Plant Residuals Management Project	No	2011 - 2028	696
Rinconada Water Treatment Plant: Reliability Improvement Project	No	2011 - 2028	62
Kirk Diversion Dam Replacement and Fish Screen Project	No	2011 - 2028	7
Upper Guadalupe River Flood Control Project- Reach 12	No	2011 - 2028	14
Coyote Ridge Long Term Management Plan	No	2011 - 2028	4
Upper Penitencia Creek Property Acquisition and Long Term Management Plan	No	2011 - 2028	1
South County Recycled Water Master Plan Project	No	2011 - 2028	26
Coyote Warehouse Project	No	2011 - 2028	24
Upper Berryessa Creek Flood Risk Management Project	No	2011 - 2028	103
Penitencia Delivery Main and Penitencia Force Main Seismic Retrofit Project	No	2011 - 2028	5
Penitencia and Santa Teresa Water Treatment Plants Solar Project	No	2011 - 2028	3
Upper Guadalupe Reach 6 Aquatic Habitat Improvement Project	No	2011 - 2028	23
Permanente Creek Flood Protection Project	No	2011 - 2028	234
Uvas Creek Levee Rehabilitation Project	No	2011 - 2028	13
Main Avenue and Madrone Pipeline Restoration Project	No	2011 - 2028	57
Cunningham Flood Detention Facility Certification Project	No	2011 - 2028	38
Upper Llagas Creek Flood Protection Project	No	2011 - 2028	831
Saratoga Creek Hazard Tree Removal and Restoration Project	No	2011 - 2028	15
Calabazas Creek Bank Rehabilitation Project	No	2011 - 2028	19
South San Francisco Bay Shoreline	No	2011 - 2028	876
Total	**N/A**	**N/A**	**8,115**

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data provided by Valley Water.

For the legislative-adjusted forecast, emissions from two sources were adjusted: 1) construction employee commute to the job site, and 2) heavy-duty on-road construction vehicles. Based on Ascent's analysis of project Environmental Impact Reports (EIRs), these emissions sources were assumed to represent approximately 16 percent and 17 percent of total project emissions in the BAU case, respectively, with the remaining 67 percent of emissions due to off-road construction vehicles. Emissions from construction employee commute to the job site were adjusted to account for ACC2 (as employees were generally assumed to drive light-duty vehicles subject to ACC2), and emissions from heavy-duty on-road construction vehicles were adjusted to account the EV mandates in Advanced Clean Fleets. Emissions from these EVs are assumed to be zero based on the relatively negligible contribution from upstream electricity generation in future years, consistent with the assumptions for Employee Commute.

Table 31 below shows the results of this calculation. For construction employee commute, the legislative-adjusted case shows a 30 percent reduction (relative to BAU) to employee commute emissions per VMT based on the difference between 2021 and 2030 light-duty emissions factors in Santa Clara County, and an 87 percent reduction by 2045; these reductions were calculated using EMFAC outputs, adjusted to include the effects of increasing electric vehicle penetration under ACC2. Similarly, emissions from heavy-duty on-road vehicles were adjusted based on ACF targets of 23% EVs by 2030, and 100% EVs by 2045 (these vehicles were assumed, like those of Valley Water, to be subject to the milestones of Group 2; see Table 20).

Table 31 Forecasted Emissions (MT CO_2e) from Construction, BAU and Legislative-Adjusted

Year	BAU					Leg-Adjusted				
	Total	Employee Commute Only	Heavy-Duty on-road vehicles	Off-road vehicles	BAU emissions percent change from baseline	Total	Employee Commute Only	Heavy-duty on-road vehicles	Off-road vehicles	Legislative-adjusted emissions percent change from baseline
Baseline	6,990	1,110	1,175	4,706	0%	6,990	1,110	1,175	4,706	0%
2030	8,115	1,288	1,364	5,464	16%	7,384	834	911	5,640	6%
2045	8,115	1,288	1,364	5,464	16%	5,629	161	71	5,398	-19%

Notes:; BAU = Business as Usual ; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: EIR data provided by Valley Water; calculations performed by Ascent in 2023.

For both the BAU and legislative-adjusted forecasts, construction emissions calculations did not include emissions from the Anderson Dam Seismic Retrofit Project. This is because emissions from these projects are required to be mitigated to net-zero by mitigation measures included in their Environmental Impact Reports (Valley Water 2025:55, Valley Water 2025:3.9-26).

Solid Waste

Solid waste activity was assumed to continue at the rate of the historical average in the baseline years, 2017-2021. Thus, emissions results are identical to those shown in Section 1.

Wastewater

Wastewater activity was assumed to continue at the rate of the historical average in the baseline years, 2017-2021. Thus, emissions results are identical to those shown in Section 1.

Sediment Hauling

Sediment hauling activity was assumed to continue at the historical average in the baseline years, 2017-2021. In the legislative-adjusted case, Advanced Clean Fleets reduced the emissions factor of the dump trucks by approximately 23 percent in 2030, and 100 percent by 2045. Table 32 below shows the effects of Advanced Clean Fleets on the emissions result.

Table 32 Forecasted Emissions from Sediment Hauling

Year	BAU GHG Emissions ($MTCO_2e$)	Legislative-Adjusted GHG Emissions ($MTCO_2e$)	BAU emissions percent change from baseline	Legislative-adjusted emissions percent change from baseline
Baseline	62	62	0%	0%
2030	62	48	0%	-23%
2045	62	0	0%	-100%

Notes: BAU = business as usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Calculations performed by Ascent in 2023.

2.4 SUMMARY OF FORECAST RESULTS FOR ALL SECTORS

Table 33 below summarizes results for 2030 and 2045 legislative-adjusted and BAU forecasts.

Table 33 Summary of Forecast Results for All Sectors

Scope	Sector	BAU GHG Emissions ($MTCO_2e$)		Legislative-Adjusted GHG Emissions ($MTCO_2e$)	
		2030	2045	2030	2045
1	On-Road Fleet	1,212	1,378	933	58
	Natural Gas Use in Buildings	745	745	745	745
	Off-road fleet	952	1,082	952	1,082
	High GWP Gases	79	79	79	79
	Scope 1 Subtotal	**2,989**	**3,284**	**2,710**	**1,965**
2	Facility Electricity Usage	95	95	93	0
	Scope 2 Subtotal	**95**	**95**	**93**	**0**
3	Construction	8,115	8,115	7,408	5,629
	Imported Water	4,174	4,222	1,372	0
	Employee Commute	981	981	651	129
	Wastewater	9	9	9	9
	Solid Waste	236	236	236	236
	Business Travel	147	147	131	104
	Sediment Hauling	62	62	48	0
	Scope 3 Subtotal	**13,724**	**13,772**	**9,854**	**6,107**
Total		**16,808**	**17,151**	**12,656**	**8,071**

Notes: BAU = business as usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Calculations performed by Ascent in 2025.

REFERENCES

AFDC. *See* US Alternative Fuels Data Center.

Alvarez, R. A., Zavala-Araiza, D., Lyon, D. R., Allen, D. T., Barkley, Z. R., Brandt, A. R., Davis, K. J., Herndon, S. C., Jacob, D. J., & Hamburg, S. P. 2018. *Assessment of methane emissions from the U.S. oil and gas supply chain.* Science, 361(6398), 186-188.

Association of Bay Area Governments and Metropolitan Transportation Commission. 2021. *Plan Bay Area 2050: Forecasting and Modeling Report.* Available: https://www.planbayarea.org/sites/default/files/documents/Plan_Bay_Area_2050_Forecasting_Modeling_Report_October_2021.pdf. Accessed October 11, 2023.

Association of California Water Agencies. 2025 (January 25). CARB Continues to Enforce State and Local Clean Fleets Requirements. Available: https://www.acwa.com/news/carb-continues-to-enforce-state-and-local-clean-fleets-requirements/. Accessed March 18, 2025.

Beaulieu, J., Waldo, S., Balz, D., Barnett, W., Hall, A., Platz, M., & White, K. 2020. *Methane and carbon dioxide emissions from reservoirs: Controls and Upscaling. Journal of Geophysical Research*. Biogeosciences, 125(12), e2019JG005474. American Geophysical Union, Washington, DC.

BTS. *See* US Bureau of Transportation Statistics.

Bureau of Labor Statistics. 2022. *Employee Tenure in 2022.* Available: https://www.bls.gov/news.release/pdf/tenure.pdf. Accessed October 12, 2023.

California Air Resources Board. 2018. *Public Hearing to Consider the Proposed Amendments to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions. Staff Report: Initial Statement of Reasons*. Available: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2018/ghg2018/isor.pdf. Accessed July 14, 2023.

———. 2021. *EMFAC2021 Volume III Technical Document.* Available: https://ww2.arb.ca.gov/sites/default/files/2021-03/emfac2021_volume_3_technical_document.pdf. Accessed July 17, 2023.

———. 2023a. *EMissions FActor Model.* Available: https://arb.ca.gov/emfac/. Accessed July 17, 2023.

———. 2023b. *Accelerating Zero-Emissions Truck Markets.* Available: https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-summary. Accessed July 17, 2023.

California Department of Resources Recycling and Recovery. 2019. *Estimated Solid Waste Generation Rates.* Available: https://www2.calrecycle.ca.gov/wastecharacterization/general/rates. Accessed July 13, 2023.

———. 2023. *State of Disposal and Recycling in California.* Available: https://calrecycle.ca.gov/reports/stateof/. Accessed October 12, 2023.

CARB. *See* California Air Resources Board.

California Department of Water Resources. 2023a. State Water Project. Available: https://water.ca.gov/programs/state-water-project. Accessed July 13, 2023.

———. 2023b. Producing and Consuming Power. Available: https://water.ca.gov/What-We-Do/Power. Accessed July 13, 2023.

———. 2023c. State Water Project Energy Intensity of Water Supplies. Available: https://dwr.maps.arcgis.com/apps/Styler/index.html?appid=c112a21431884158b58fc5564e66c439. Accessed July 13, 2023.

California Energy Commission. 2022 (August). *2022 Building Energy Efficiency Standards for Residential and Nonresidential Buildings*. Available: https://www.energy.ca.gov/sites/default/files/2022-12/CEC-400-2022-010_CMF.pdf. Accessed July 14, 2023.

CalRecycle. *See* California Department of Resources Recycling and Recovery.

CARB. *See* California Air Resources Board.

CDWR. *See* California Department of Water Resources.

CEC. *See* California Energy Commission.

Chesonis, Frank; Esposo, Lowell; Leonardo, Tony and Ndah, Tony. Valley Water Facilities Team. San Jose, CA. August 22, 2023—meeting with Sarah Yong and Nick Mascarello to discuss forecasting of fuel usage in Valley Water fleet.

City of San Jose. 2017. Treatment Process. Available: https://www.sanjoseca.gov/your-government/departments-offices/environmental-services/water-utilities/regional-wastewater-facility/treatment-process. Accessed March 18, 2025.

Delta Vision Task Force. 2017. *Overview on Central Valley Project Financing, Cost Allocation, and Repayment Issues*. Available: https://cawaterlibrary.net/wp-content/uploads/2017/05/CVP_Financing_and_Repayment_Summary_9-18-08.pdf. Accessed July 17, 2023.

Environmental Defense Fund. n.d. *US Natural Gas Leakage Model User Guide*. Available: https://www.edf.org/sites/default/files/US-Natural-Gas-Leakage-Model-User-Guide.pdf. Accessed March 6, 2025.

EPA. *See* US Environmental Protection Agency.

Federal Highway Administration. 2000. "Chapter 3: Truck Fleet and Operations." In *Comprehensive Truck Size and Weight Study*. Available: https://www.fhwa.dot.gov/reports/tswstudy/vol2-chapter3.pdf. Accessed July 13, 2023.

FHWA. *See* Federal Highway Administration.

ICLEI. *See* ICLEI – Local Governments for Sustainability.

ICLEI – Local Governments for Sustainability. 2019. *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions*. Version 1.2. Available: https://icleiusa.org/us-community-protocol/. Accessed July 13, 2023.

Idaho National Laboratory. n.d. *Comparing Energy Costs per Mile for Electric and Gasoline-Fueled Vehicles*. Available: https://avt.inl.gov/sites/default/files/pdf/fsev/costs.pdf. Accessed July 14, 2023.

INL. *See* Idaho National Laboratory.

Intergovernmental Panel on Climate Change. 2022. "Annex II: Definitions, Units and Conventions." In *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by P.R. Shukla, J. Skea, R. Slade, A. A. Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, and J. Malley. Cambridge University Press. Cambridge, UK, and New York, NY, USA.

IPCC. *See* Intergovernmental Panel on Climate Change.

Pacific Gas and Electric. 2022. "2022 Clean System Power Calculator, 30 MMT Alternative." Available: https://www.pge.com/pge_global/common/word_xls/for-our-business-partners/energy-supply/integrated-resource-planning/2022-Clean-Power-System-Calculator-30-MMT-Alternative.xlsb. Accessed July 17, 2023.

San Jose Clean Energy. 2022. 2022 Clean System Power Calculator (30 MMT). Available: https://sanjosecleanenergy.org/wp-content/uploads/2022/11/sjce_csp_30mmt_preferred_conforming_na_public_v1.zip. Accessed July 17, 2023.

Silicon Valley Clean Energy. 2022. Clean System Power Calculator: 30 MMT Preferred Conforming. Available: https://svcleanenergy.org/wp-content/uploads/svce_csp_30mmt_preferred_conforming_na_public_v1.xlsx. Accessed July 17, 2023.

Santa Clara Valley Water District. 2019 (November). *Water Supply Master Plan 2040*. Available: https://www.valleywater.org/sites/default/files/Water%20Supply%20Master%20Plan%202040_11.01.2019_v2.pdf. Accessed July 14, 2023.

———. 2023a. *Five-Year Capital Improvement Program.* Available: https://www.valleywater.org/how-we-operate/five-year-capital-improvement-program. Accessed July 14, 2023.

———. 2023b. *Classified Benefits Summary.* Available: https://www.valleywater.org/benefits-summary-classified-jobs-positions Accessed October 12, 2023.

———. 2023c. Mendenhall, Brian. Senior Water Resources Specialist. Santa Clara Valley Water District, San Jose, CA. October 23, 2023—email providing Valley Water's telework policy (Telework Program, W-621-171 Revision E).

———. 2025. *Anderson Dam Seismic Retrofit Project Final Environmental Impact Report Volume 1.* Available; https://fta.valleywater.org/dl/TUzIdixGJd. Accessed July 24, 2025.

The Climate Registry. 2023. Credible Carbon Reporting. Available: https://theclimateregistry.org/. Accessed July 13, 2023.

US Alternative Fuels Data Center. 2022 (October). Average Per-Passenger Fuel Economy by Travel Mode. Available: https://afdc.energy.gov/data/10311. Accessed July 13, 2023.

US Bureau of Transportation Statistics. 2023. Average Passenger Revenue per Passenger-Mile. Available: https://www.bts.gov/content/average-passenger-revenue-passenger-mile. Accessed July 13, 2023.

US Environmental Protection Agency. 2022. New Monitoring Method Improves Ability to Measure Methane Emissions from Reservoirs. Available: https://www.epa.gov/sciencematters/new-monitoring-method-improves-ability-measure-methane-emissions-reservoirs. Accessed April 21, 2025. Last updated January 3, 2022.

———. 2023a. GHG Emission Factors Hub. Last updated April 3, 2023. Available: https://www.epa.gov/climateleadership/ghg-emission-factors-hub. Accessed July 13, 2023.

———. 2023b. eGRID Summary Tables 2021. Available: https://www.epa.gov/system/files/documents/2023-01/eGRID2021_summary_tables.pdf. Accessed July 13, 2023.

———. 2024. Research on Emissions from U.S. Reservoirs. Available: https://www.epa.gov/air-research/research-emissions-us-reservoirs. Accessed April 21, 2025. Last updated November 13, 2024.

Valley Water. *See* Santa Clara Valley Water District.

WAPA. *See* Western Area Power Administration.

Waste Management. 2023. Kirby Canyon Landfill – Operations. Available: https://kirbycanyon.wm.com/about-us/operations.jsp. Accessed July 13, 2023.

Western Area Power Administration. 2017. "2025 Power Marketing Plan." *Federal Register* 82(156): 38675-38685. Available: https://www.federalregister.gov/documents/2017/08/15/2017-17210/2025-power-marketing-plan. Accessed July 13, 2023.

Yigzaw, Simret. 2015. Nutrient Removal at the San Jose-Santa Clara Regional Wastewater Facility. Poster abstract. 2015 San Francisco Estuary Conference. Available: https://www.sfestuary.org/wp-content/uploads/2013/10/4-San-Jose-Santa-Clara-Regional-Wastewater-Facility-Treating-Wastewater-and-Enhancing-the-Bay.pdf. Accessed March 18, 2025.

Appendix E

Implementation Plan Details

Table E-1 Implementation Plan Details

Sector	Measure #	Measure Name	Measure Description	Implementing Division and Unit	Tracking Metric	Roles and Responsibilities	Monitoring Plan	Enforcement Plan	Funding Mechanism
Fleet	VF-1	Zero Emission On-Road Fleet	Convert 35% of Valley Water's on-road fleet fuel use to zero-emission fuels by 2030, and 100% by 2045.	Division: General Services Unit: Equipment Management (885)	Total gallons of conventional fuel divided by VMT - use multiyear average to account for inter-year variability	Fleet Manager to accelerate procurement of ZEVs as necessary to achieve targets for zero-emission fuel usage.	Collect list of all vehicles in fleet, gallons of gasoline used, and their associated VMT, every 2 years.	Require fleet planning and vehicle procurement process to accelerate the replacement of existing on-road fleet vehicles with ZEVs to achieve zero-emission fuel targets.	CARB Clean Truck and Bus Vouchers, California Vehicle Rebate Program, Hybrid and Zero Emission Truck and Bus Voucher Incentive Project, Inflation Reduction Act
Fleet	OF-1	Zero Emission Off-Road Fleet	Convert 50% of Valley Water's off-road fleet conventional diesel use to zero-emission fuels in 2030 and 100% by 2045, regardless of engine tier.	Division: General Services Unit: Equipment Management (885)	Total gallons conventional fuel - multiyear average	Fleet Manager to maintain usage of renewable diesel and accelerate replacement of off-road fleet as necessary to achieve targets for zero-emission fuel usage.	Collect list of all equipment in fleet and gallons of conventional fuel used, every 2 years	Maintain contracts for renewable diesel at fuel farm and require fleet planning and vehicle procurement process to accelerate the replacement of existing off-road fleet to achieve zero-emission fuel targets.	Clean Off-Road Equipment Voucher Incentive Project (CORE), Carl Moyer Program
High GWP Gases	HG-1	Phase out High-GWP refrigerants	Replace high GWP refrigerants with low GWP alternatives above and beyond the requirements of Senate Bill 1206.	Division: General Services Unit: Facilities Management (887)	Weighted average GWP of purchased refrigerants	Supervising HVAC Mechanic to continue procurement of low GWP refrigerants at time of replacement, as feasible.	Collect list and quantities of high-GWP gases purchased annually.	Develop purchasing requirements to prohibit purchase of high-GWP refrigerants is prohibited unless no low GWP alternative is available.	CARB F-gas Reduction Incentive Program
Facility Energy	FE-1	Facility Electrification	Electrify 30% of existing facility natural gas use by 2030, and 60% by 2045.	Division: General Services Unit: Facilities Management (887)	Natural gas usage – multiyear average	Facilities Manager/ Supervising HVAC Mechanic to continue practice of replacing gas-fired equipment with electric equipment upon end of serviceable life or failure.	Collect data on natural gas usage in buildings annually.	Develop purchasing requirements to mandate the purchase of electric space and water heating equipment at time-of-replacement at the pace necessary to achieve electrification targets.	Energy Conservation Assistance Act Low-Interest loans, Inflation Reduction Act
Employee Commute	EC-1	Reduce Employee Commute VMT	Implement incentives to encourage employees to reduce their VMT or reduce emissions from their commute vehicle.	Division: Human Resources Unit: Total Rewards and Data Analytics	Employee VMT	Human Resources to explore additional incentives to reduce commute VMT and encourage alternatives to vehicle commuting.	Review utilization and effectiveness of incentives every two years.	N/A - Valley Water cannot directly control employee commute choices.	California E-Bike Incentive Project
Solid Waste	SW-1	Increase Solid Waste Diversion	Divert 80% of waste from Valley Water offices from landfills by 2030, and 90% by 2045. Improve solid waste tracking by conducting regular assessments of waste characterization.	Division: General Services Unit: Facilities Management (887)	Tons of landfilled waste collected from Valley Water facilities	Valley Water to ensure that all buildings have easily accessible recycling and composting bins and explore opportunities to educate employees about appropriate bin sorting.	Valley Water will conduct a waste characterization survey every three years, and will monitor tons landfilled, recycled, and composted.	N/A - Valley Water can advocate for waste diversion, but cannot directly enforce this measure.	Pollution Prevention (P2) Grant Program, CalRecycle Food Waste Prevention and Rescue Grant Program, CalRecycle Beverage Container Recycling Grants
Construction	CN-1	Carbon Free Off-Road Construction Equipment	For all contracted construction projects, require the use of zero-emission fuels instead of conventional diesel in 17% of off-road construction equipment fuel use in equipment greater than 25 hp by 2030, and 45% by 2045 regardless of the engine Tier.	Division: Water Utility Capital Unit: Construction Services (351)	Fuel used in construction – multiyear average	Construction Services Division to update Standard Provisions to mandate increasing percentages of zero-emission vehicles and zero-emission fuels to be used in construction.	For every future construction project, contractor to submit fuel usage reports to Valley Water, documenting fleet composition and all forms of fuel usage during project construction.	Construction contractors will be required to conform with Standard Provision dictating usage targets for zero-emission fuels and associated reporting requirements.	Clean Off-Road Equipment Voucher Incentive Project (CORE), Carl Moyer Program
Construction	CN-2	Carbon Free On-Road Construction Vehicles	For all contracted construction projects, require the use of zero-emission fuels instead of conventional fuel in 35% of on-road construction vehicle fuel use by 2030, and 95% by 2045.	Division: Water Utility Capital Unit: Construction Services (351)	Fuel used in construction – multiyear average	Construction Services to update Standard Provisions to mandate increasing percentages of zero-emission vehicles and zero-emission fuels to be used in construction.	For every new construction project, contractor to submit fuel usage reports to Valley Water, documenting all forms of fuel usage during project construction.	Construction contractors will be required to conform with Standard Provision dictating usage targets for zero-emission fuels and associated reporting requirements.	CARB Clean Truck and Bus Vouchers, California Vehicle Rebate Program, Hybrid and Zero Emission Truck and Bus Voucher Incentive Project, Inflation Reduction Act

Sector	Measure #	Measure Name	Measure Description	Implementing Division and Unit	Tracking Metric	Roles and Responsibilities	Monitoring Plan	Enforcement Plan	Funding Mechanism
Water Conservation	WA-1	Community-Wide Water Conservation	Increase communitywide water conservation to 118,000 acre-feet per year by 2045.	Division: Water Supply Unit: Water Supply Planning and Conservation	Acre-feet of water conserved	Conservation Program provide annual update on water conservation and upon request, provide funding or resources to support Valley Water facilities that results in reduced water use.	Annually review and assess effectiveness of Valley Water's water conservation program.	N/A - Valley Water can promote water conservation, but cannot directly require it.	Valley Water Operations Budget
Carbon Sequestration	CS-1	Sequester Carbon	Sequester carbon in enhancement and voluntary projects. Collaborate with regional conservation agencies to identify projects that are beyond project mitigation.	Division: Watersheds Stewardship and Planning Unit: Water Resources Planning and Policy	Additional carbon sequestration ($MTCO_2e$) derived from restoration/enhancement projects	GHGRP Implementation Team to establish Carbon Sequestration Registry per CS-1.	Track success of restoration/enhancement projects and net change in carbon sequestration.	Prepare documentation that carbon sequestration reductions conform to criteria described in CS-1 prior to their accounting as part of future GHG inventories.	Measure AA, San Francisco Bay Water Quality Improvement Fund, other Local, State, Federal grants, Valley Water CIP Budget.
Carbon Sequestration	CS-2	Purchase Carbon Offsets	If necessary, purchase carbon offsets from verified offset registries, prioritizing local or regional projects and, if necessary, projects outside of the state, but within the United States. Prohibit carbon offset purchases that are unverified or located in locations outside the United States.	Division: Watersheds Stewardship and Planning Unit: Water Resources Planning and Policy	$MTCO_2e$ of carbon offsets purchased and retired	GHGRP Implementation Team to develop process to purchase carbon offsets from CARB-verified registry.	GHGRP Implementation Team to track progress of GHG reductions from measures above and assess need for carbon offsets as a backstop to remain within carbon budget.	Revise Board Ends Policy for carbon neutrality to align with GHGRP targets and carbon budget. If purchased, acquire documentation that carbon offsets conform to criteria described in CS-1 from registry.	Valley Water CIP Budget

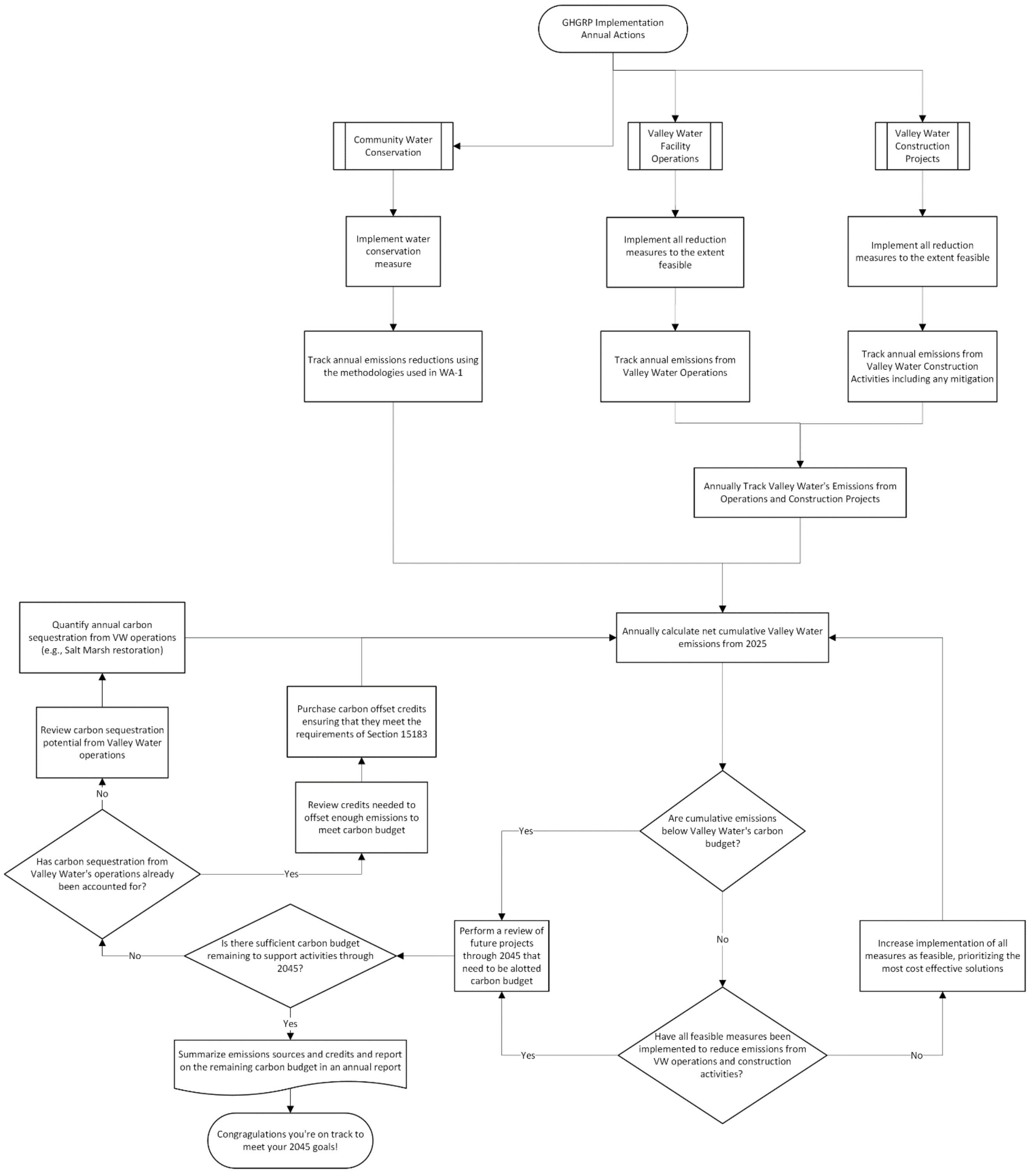
Notes: CARB = California Air Resources Board; EV = Electric Vehicle; F-Gas = Fluorinated Greenhouse Gases; GWP = Global Warming Potential; RFP = Request for Proposal; VMT = Vehicle-Miles Traveled.

Source: Prepared by Ascent in 2025.

Appendix F

GHGRP Implementation Flow Diagram

Achieving Carbon Neutrality using a Carbon Budget Approach



Appendix G

Prioritization Matrix

Table G-1 Prioritization Matrix

Sector	Measure Number	Measure Name	Measure Description	Feasibility[1]	Cost[2]	GHG Reduction Potential. 2025-2045[3]
Fleet	VF-1	Zero Emission On-Road Fleet	Implement a Zero Emission Fleet Plan to convert 35% of on-road fleet fuel use to zero-emission fuels (e.g., electricity, renewable diesel) by 2030, and 100% by 2045.	Medium[4]	Medium	Low
Fleet	OF-1	Zero Emission Off-Road Fleet	Require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional diesel in 50% of Valley Water's off-road fleet fuel use in equipment by 2030, and 100% by 2045 regardless of engine Tier.	Medium	High	High
High GWP Gases	HG-1	Phase Out High-GWP refrigerants	Replace high GWP refrigerants with low GWP alternatives above and beyond the requirements of SB 1206.	High	Low	Low
Facility Energy	FE-1	Facility Electrification	Electrify 30% of existing facility energy use by 2030, and 60% by 2045.	Medium	Medium	Medium
Employee Commute	EC-1	Reduce Employee Commute Emissions	Implement a companywide commute challenge with rewards and competitions to encourage employees to reduce their VMT or reduce emissions from their commute vehicle. Offer a variety of incentives, including e-bike rebates, and parking cash-out programs.	High	Low	Low
Solid Waste	SW-1	Increase Solid Waste Diversion	Divert 80% of waste from Valley Water offices from landfills by 2030, and 90% by 2045. Improve solid waste tracking by conducting regular assessments of waste characterization.	Low	Medium	Medium
Construction	CN-1	Zero Emission Off-Road Construction Equipment	For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional diesel in 17% of off-road construction equipment fuel use in equipment greater than 25 hp by 2030, and 45% by 2045 regardless of the engine Tier.	Low	High	High
Construction	CN-2	Zero Emission On-Road Construction Vehicles	For all contracted construction projects, require the use of zero-emission fuels (e.g., electricity, renewable diesel) instead of conventional fuel in 35% of on-road construction vehicle fuel use by 2030, and 95% by 2045.	Low	High	Low
Water Conservation	WA-1	Increase Water Conservation	Increase communitywide water conservation to 118,800 acre-feet per year by 2045.	High	Low	Medium
Carbon Sequestration	CS-1	Sequester Carbon	Sequester carbon in enhancement and voluntary projects. Collaborate with regional conservation agencies to identify projects that are beyond project mitigation.	Medium	High	High

Notes: GHG = Greenhouse Gases; GWP = Global Warming Potential; VMT = Vehicle-Miles Traveled

[1] For feasibility, a “High” score means that the measure relies on proven, currently commercially available, and scalable technology or processes. A “Medium” score means that the technology or process to implement the measure is available but may still be in its pilot or demonstration stages and have challenges scaling or deploying. A “Low” score means that there are substantial technical barriers to implementing a measure because the technology is still in its early stages, or because its ability to scale is unknown.

[2] Cost is a qualitative metric intended only to rank the different cost impacts of measures. Quantitative cost estimates are unknown and depend on market conditions, engineering constraints, and the availability of technology. “High” means that the measure has substantial effects on Valley Water’s costs; “Medium” and “Low” imply progressively lower costs.

[3] For GHG reduction potential, total 2025-2045 reductions were calculated for each measure, and then measures were then ranked according to those reductions. The top third of measures received a score of “High,” the middle third “Medium,” and the bottom third “Low.”

[4] Depending on market conditions and supply chain availability for zero-emission fuels.

Source: Prepared by Ascent in 2025.

Appendix H

Carbon Budget Consistency Calculation Examples for New Projects

Tables H-1 and H-2, respectively, show two examples of a hypothetical project that is consistent with the carbon budget (Project A) and one that is not (Project B). The tables intend to show Valley Water's forecasted emissions with the implementation of GHGRP reduction measures, reductions from WA-1 and CS-1, the new project, and the carbon budget. Because actual future emissions would vary year to year depending on the status of the GHGRP implementation, the values shown in the yellow cells are example inputs and are rounded versions of the forecasts shown in Table 4 and Figure 6. Because actual future Valley Water emissions are not yet known, the example forecasts in the second column are for demonstration purposes only.

PROJECT EXAMPLE THAT MEETS THE CARBON BUDGET

In Table H-1, Project A is a six-year project that is anticipated to emit 500 $MTCO_2e$ per year between 2030 and 2035. This annual emissions level is similar to that of an environmental restoration project. The cumulative carbon budget for 2045 is 123,138 $MTCO_2e$.

Table H-1 Carbon Budget Tracking Table Example for Project A that meets Carbon Budget ($MTCO_2e$)

Year	Operations and On-Going Construction Projects	Reductions from WA-1 and CS-1	Emissions from New Project A	Carbon Offset Credits Purchased	Total Annual Emissions	Cumulative Emissions from 2025	Cumulative Carbon Budget	2045 Budget Exceeded?
2025	12,500	0	0	0	12,500	12,500	11,787	No
2026	11,800	-300	0	0	11,500	24,000	22,973	No
2027	11,100	-300	0	0	10,800	34,800	33,556	No
2028	10,500	-300	0	0	10,200	45,000	43,538	No
2029	9,800	-300	0	0	9,500	54,500	52,918	No
2030	9,100	-500	500	0	9,100	63,600	61,695	No
2031	8,700	-600	2,000	0	8,600	72,200	69,888	No
2032	8,300	-700	2,000	0	8,100	80,300	77,495	No
2033	7,900	-800	2,000	0	7,600	87,900	84,517	No
2034	7,500	-900	2,000	0	7,100	95,000	90,954	No
2035	7,200	-1,200	2,000	0	6,500	101,500	96,806	No
2036	6,800	-1,500	0	0	5,300	106,800	102,072	No
2037	6,400	-2,700	0	0	3,700	110,500	106,754	No
2038	6,000	-3,900	0	0	2,100	112,600	110,850	No
2039	5,600	-5,000	0	0	600	113,200	114,361	No
2040	5,300	-5,900	0	0	-600	112,600	117,287	No
2041	4,900	-6,900	0	0	-2,000	110,600	119,627	No
2042	4,500	-8,000	0	0	-3,500	107,100	121,383	No
2043	4,100	-8,200	0	0	-4,100	103,000	122,553	No
2044	3,700	-8,200	0	0	-4,500	98,500	123,138	No
2045	3,400	-8,200	0	0	-4,800	93,700	123,138	No

Notes: Cells in yellow are sample Valley Water inputs.

Source: Prepared by Ascent in 2025

As shown in Table H-1, the addition of Project A's emissions would not result in an exceedance of Valley Water's carbon budget by 2045, given the known emissions forecasts and emissions current as of the project analysis. With the project, Valley Water's cumulative emissions from 2025 to 2045 would be estimated at 93,700 $MTCO_2e$, which is less than the carbon budget of 123,138 $MTCO_2e$. The cumulative emissions decline over time mostly due to the reductions from CS-1.

PROJECT EXAMPLE THAT EXCEEDS THE CARBON BUDGET

In Table H-2, Project B is a 10-year project that is anticipated to emit 2,000 $MTCO_2e$ per year from 2030 through 2044. This annual emissions level is similar to that of a flood protection project. The cumulative carbon budget for 2045 remains at 123,138 $MTCO_2e$. The forecasted operational and known construction emissions remain the same, as shown in Table H-1.

Table H-2 Carbon Budget Tracking Table Example for Project B that exceeds Carbon Budget ($MTCO_2e$)

Year	Operations and On-Going Construction Projects	Reductions from WA-1 and CS-1	Emissions from New Project B	Carbon Offset Credits Purchased	Total Annual Emissions	Cumulative Emissions from 2025	Cumulative Carbon Budget	2045 Budget Exceeded?
2025	12,500	0			12,500	12,500	11,787	No
2026	11,800	-300			11,500	24,000	22,973	No
2027	11,100	-300			10,800	34,800	33,556	No
2028	10,500	-300			10,200	45,000	43,538	No
2029	9,800	-300			9,500	54,500	52,918	No
2030	9,100	-500			8,600	63,100	61,695	No
2031	8,700	-600			8,100	71,200	69,888	No
2032	8,300	-700			7,600	78,800	77,495	No
2033	7,900	-800			7,100	85,900	84,517	No
2034	7,500	-900			6,600	92,500	90,954	No
2035	7,200	-1,200	3,000		9,000	101,500	96,806	No
2036	6,800	-1,500	3,000		8,300	109,800	102,072	No
2037	6,400	-2,700	3,000		6,700	116,500	106,754	No
2038	6,000	-3,900	3,000		5,100	121,600	110,850	No
2039	5,600	-5,000	3,000		3,600	125,200	114,361	**Yes**
2040	5,300	-5,900	3,000		2,400	127,600	117,287	**Yes**
2041	4,900	-6,900	3,000		1,000	128,600	119,627	**Yes**
2042	4,500	-8,000	3,000		-500	128,100	121,383	**Yes**
2043	4,100	-8,200	3,000		-1,100	127,000	122,553	**Yes**
2044	3,700	-8,200	3,000		-1,500	125,500	123,138	**Yes**
2045	3,400	-8,200	3,000		-1,800	123,700	123,138	**Yes**

Notes: Cells in yellow are sample Valley Water inputs.

Source: Prepared by Ascent in 2025.

As shown in Table H-2, the addition of Project B's emissions would exceed Valley Water's carbon budget by 2045, given the known emissions forecasts and current emissions. With the project, Valley Water's carbon budget would be exceeded 2 years early in 2044, by which time Valley Water's cumulative emissions from 2025 to 2044 would be estimated at 123,700 $MTCO_2e$, which is greater than the carbon budget of 123,138 $MTCO_2e$.

The results in Tables H-1 and H-2 depend on emissions from all sources considered in this GHGRP, not just the emissions from the new project being evaluated. In the case where emission reduction credits from WA-1 or CS-1 may not be as high in the future or where emissions from operations and currently known construction would be higher than anticipated, the carbon budget could be exceeded. Additionally, there could be instances where projects occurring between the 2025 and 2045 period cause an exceedance of the carbon budget during that time, but afterwards the reductions from CS-1 and WA-1 balance out Valley Water's cumulative emissions to meet the carbon budget by 2045. Given these variances, adaptive management of Valley Water's emissions is crucial to achieving carbon neutrality by 2045.