Caltrain 2023 Sustainability Report

FY2021 and FY2022 Reporting Period

Caltrain

Table of Contents

Acronym List

APTA	American Public Transportation Association
BART	Bay Area Rapid Transit
CAP	criteria air pollutants
CARB	California Air Resources Board
CCAG	City/County Association of Governments of San Mateo County
CCE	Community Choice Energy
CCF	Central Control Facility
CEMOF	Central Equipment & Maintenance Operations Facility
CEQA	California Environmental Quality Act
CH_4	methane
CNG	compressed natural gas
CO_2	carbon dioxide
COVID	SARS-CoV-2, commonly referred to as COVID-19 or Coronavirus
CPAU	City of Palo Alto Utilities
District	San Mateo County Transit District
eGRID	emissions and grid resource integrated database
EMFAC	CARB emission factor GHG emission tool
FRA	Federal Railroad Administration
FY	fiscal year
GGE	gallons of gasoline equivalent
GHG	greenhouse gas
GREET	Argonne National Laboratory greenhouse gases, regulated emissions, and energy use in technologies model
JPB	Peninsula Joint Powers Board, which owns and operates Caltrain
kBtu	thousand British thermal units
kWh	kilowatt-hours
LCFS	Low Carbon Fuel Standard
MTC	Metropolitan Transportation Commission
$MTCO_2e$	metric tons of carbon dioxide equivalent
NEPA	National Environmental Policy Act
N_2O	nitrous oxide
NTD	National Transit Database
PCE	Peninsula Clean Energy
PG&E	Pacific Gas and Electric
PMT	passenger miles traveled
p.p.	percentage points
SFMTA	San Francisco Municipal Transportation Agency
SJCE	San José Clean Energy
SMCEL JPA	San Mateo County Express Lanes Joint Powers Authority
SVP	Silicon Valley Power
TA	San Mateo County Transportation Authority
TCR	The Climate Registry
UPT	unlinked passenger trips, also called “boardings”
VM	vehicle miles
VTA	Santa Clara Valley Transportation Authority

Message from Executive Director

Since its founding in 1991, Caltrain has been making daily commutes more sustainable, and we are about to start doing so much more. Electrified service will begin in fall 2024, and with it will come a cleaner, greener Caltrain offering the best service the Peninsula has ever seen. Not only will our new electric fleet dramatically reduce emissions along the corridor, but the quality of service, comfort, and convenience will make the difference between sustainable Caltrain and highway gridlock clearer than ever. An electrified Caltrain will reduce our greenhouse gas emissions by 250,000 $MTCO_2e$ per year, the equivalent of taking nearly 55,000 cars off the road annually. We have also partnered with the California State Transportation Agency to purchase the first battery powered electric train in the United States, which will deliver zero emission service to our South Santa Clara County stations. This exciting pilot will also demonstrate the viability of electrified service in other markets across California, helping peer rail agencies find more sustainable ways of getting people where they need to go. And this is only a starting point, one that we will continue to build upon as more and more people get on board to see the future of Caltrain for themselves.

In the meantime, we continue to provide our highest ever level of train service, reducing traffic congestion and air pollution within our cities. We have always been a transportation agency dedicated to providing accessible, sustainable transportation: protecting the environment, embracing social responsibility, and improving the quality of life for the people and communities we serve.

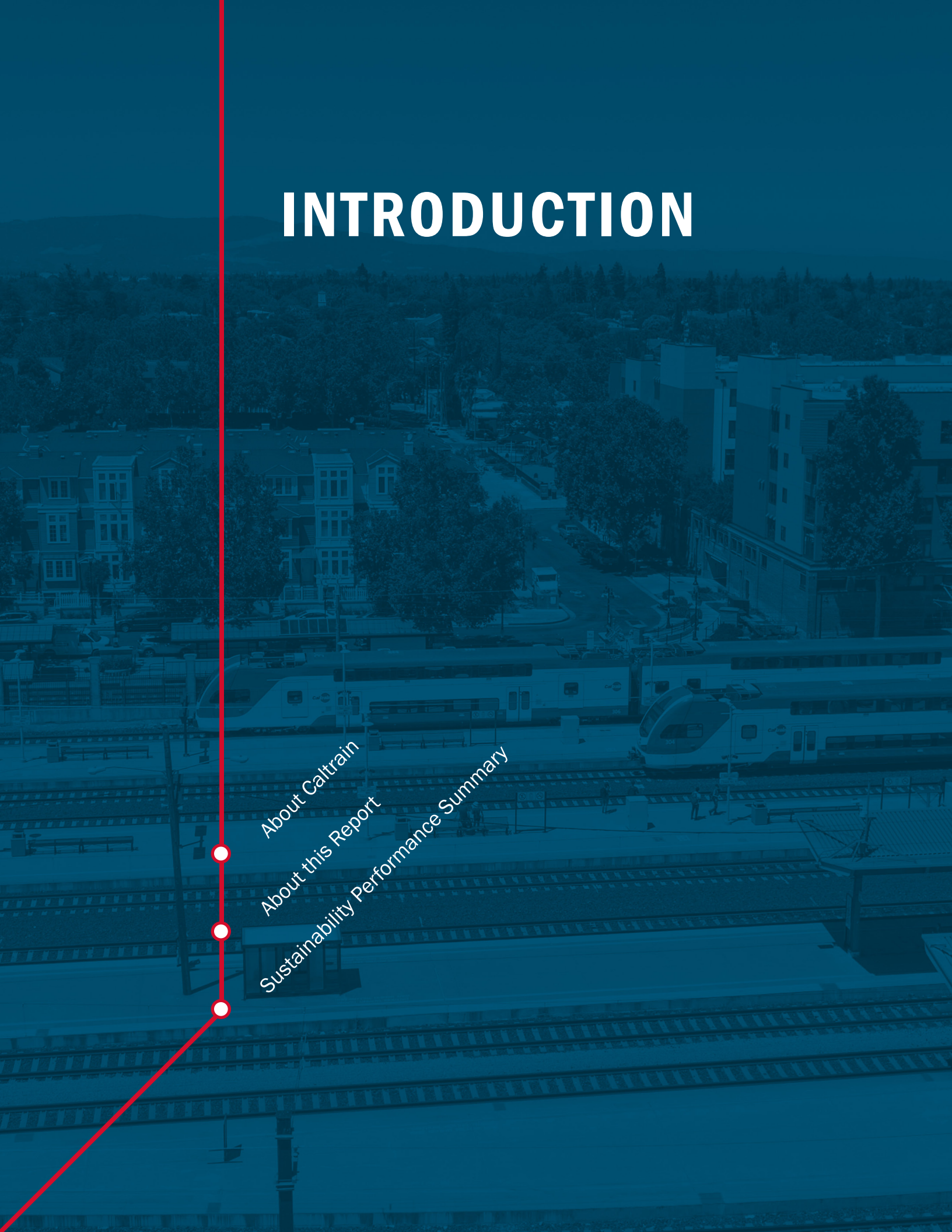
At Caltrain we are proud of the work we do every day, both to maintain our current service and to deliver Caltrain's transformative electrification program. And with our ridership on the rise and developments like the downtown extension into San Francisco on the horizon, we have high expectations for what is yet to come.

I am pleased to share this sustainability report, which summarizes our performance between 2021 and 2022, discussing key accomplishments and walking you through some of the initiatives we're working on.

Sincerely,

Michelle Bouchard
Executive Director, Caltrain

INTRODUCTION



About Caltrain

About this Report

Sustainability Performance Summary

About Caltrain

Caltrain provides commuter rail service to 31 stations in three counties from San Francisco to Gilroy. Caltrain operates 104 trains per weekday (~17,200 riders/day) including express, limited, and local trains. Caltrain is owned and operated by the Peninsula Corridor Joint Powers Board (JPB), which is comprised of three member agencies: San Mateo County Transit District, the City and County of San Francisco, and the Santa Clara Valley Transportation Authority (VTA).

About this Report

Every day, Caltrain strives to reduce the environmental impact of its operations. The sustainability program leads these ambitious initiatives to decrease waste, minimize carbon emissions, conserve water, and advance sustainable practices throughout the organization.

Sustainability is a key component of Caltrain's vision to become a mobility leader that contributes to a climate-safe future.

Approximately 40% of California's greenhouse gas (GHG) emissions stem from surface transportation (all modes). Whether Californians choose to drive or take public transit is one of the most significant climate choices they make every day. The sustainability program supports Caltrain's goal of helping residents reduce their carbon footprint, improve air quality, and eliminate regional traffic by reducing reliance on cars for transportation.

The District is a founding signatory of the American Public Transportation Association's (APTA's) Sustainability Commitment. This commitment provides a framework for transit agencies to manage sustainability within their organization and includes a set of key performance metrics for tracking sustainability performance. In April 2018, APTA recognized Caltrain with silver-level status for the agency's continued achievements in sustainability.

This is Caltrain's fourth sustainability report. This report shares Caltrain's FY2021 and FY2022 sustainability performance, including key metrics and information about sustainability achievements.

The report scope encompasses facilities, commuter rail, and shuttle services under the operational control of Caltrain. This report does not include information for employee commuting, which is included in SamTrans' separate sustainability report to avoid double-counting.

The GHG emissions discussed in the report include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), presented as metric tons of carbon dioxide equivalent ($MTCO_2e$). Other GHGs, such as sulfur hexafluoride and refrigerants, are excluded from this inventory.

GHG emissions are divided into three different categories called "scopes." Scope 1 includes all emissions directly emitted by sources owned or controlled by Caltrain (e.g., revenue vehicle diesel, gasoline, and compressed natural gas (CNG) fuel use and facility natural gas use); Scope 2 includes all indirect emissions from purchased electricity, heat, and/or steam; and Scope 3 includes all other indirect emissions (e.g., GHG emissions from water, waste, and displaced passenger trips).

Consistent with The Climate Registry (TCR) and APTA, Caltrain reports all Scope 1 and 2 GHG emissions. Caltrain also reports Scope 3 GHG emissions associated with waste generation and disposal, water usage, and avoided/displaced customer trips.

This report addresses the following sustainability indicators:

- GHG emissions
- GHG displacement
- Criteria air pollutant emissions
- Energy use from revenue vehicles
- Energy use from facilities
- Water use
- Waste generation and diversion
- Train miles
- Unlinked passenger trips (boardings)
- Displaced or avoided customer trips

Sustainability indicators are normalized by Caltrain ridership based on the total number of train boardings. Boardings represent the number of times passengers board Caltrain rail service. Normalizing by boardings enables Caltrain to evaluate improvements in vehicle productivity and operational efficiency.

Sustainability Performance Summary[1]

The following table provides information on Caltrain's sustainability performance since the publication of the previous sustainability report, which covered the period through FY2020.

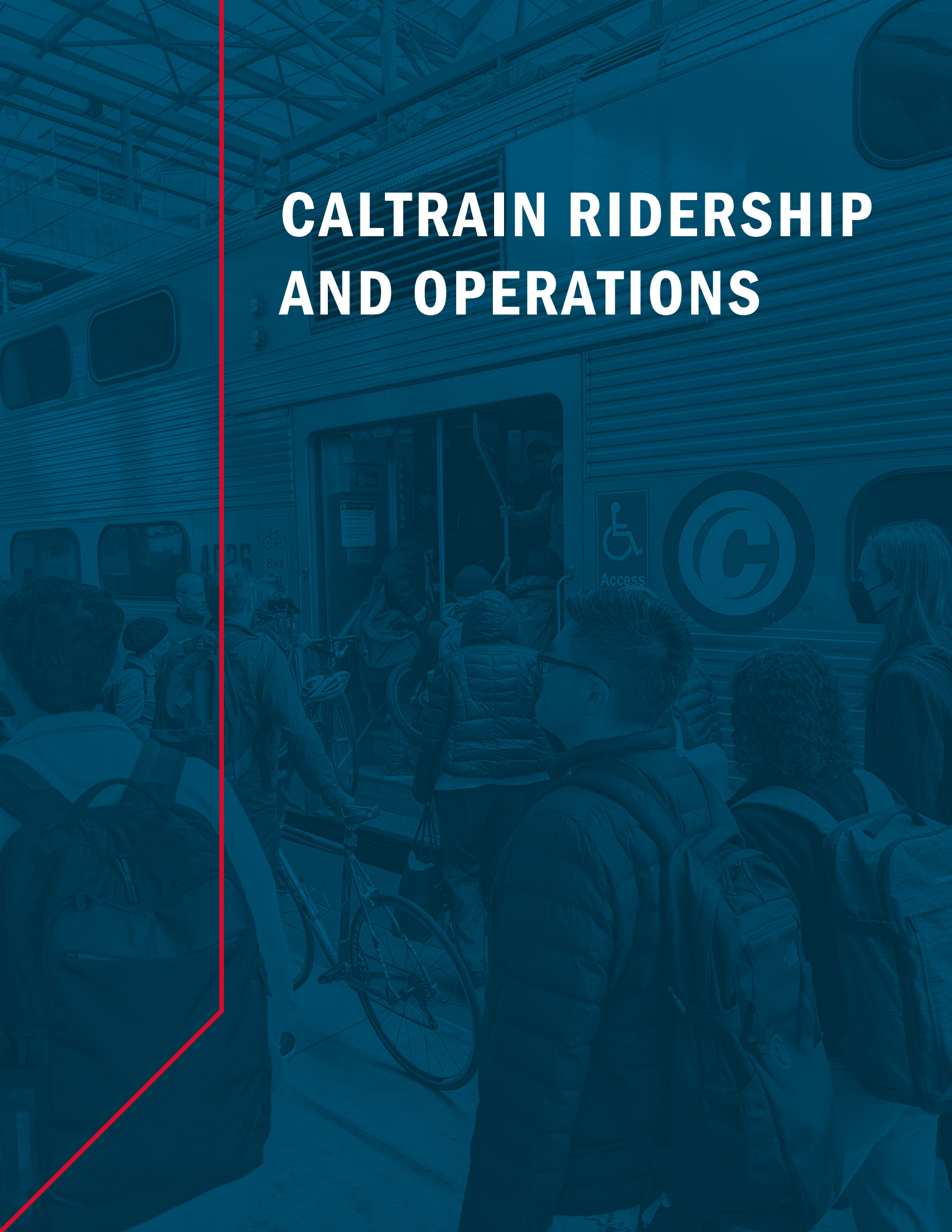
Indicator	Unit	FY2020	FY2021	FY2022	FY2020–FY2022 % Change
Greenhouse Gas Emissions					
Generated[i]	$MTCO_2e$	40,411	34,341	43,178	7%
Displaced/Avoided[ii]	$MTCO_2e$	-42,228	-3,813	-11,455	-73%
Net Total[iii]	$MTCO_2e$	-1,787	30,528	31,723	1,875%
Criteria Air Pollutant Emissions					
Generated[iv]	tons	755	641	814	8%
Displaced/Avoided[v]	tons	-190	-16	-57	-70%
Net Total[vi]	tons	565	625	757	34%
Facility Energy Use					
Electricity[vii]	kWh	6,779,832	5,977,043	5,705,527	-16%
Natural Gas[viii]	therms	9,041	34,311	6,463	-29%
Total Facility Energy Use[ix]	kBTU	24,039,505	23,824,798	20,114,212	-16%
Revenue Fleet Vehicle Energy Use					
Diesel[x]	gallons	3,815,352	3,244,481	4,118,068	8%
Gasoline[xi]	gallons	91,237	37,073	44,815	-51%
CNG[xii]	GGE	0	0	0	N/A
Total Vehicle Energy Use[xiii]	kBTU	538,286,568	452,681,501	574,287,456	7%
Water					
Consumed[xiv]	gallons	14,533,797	17,941,372	14,215,769	-2%
Waste and Recycling					
Generated[xv]	tons	480	442	433	-10%
Diverted (by weight)[xvi]	Percentage or Percentage Points	74%	68%	68%	-8%

[1]Totals may not add due to rounding. A small number of past performance figures published in our 2021 report have been restated due to changes in emissions factors or more accurate information received after the publication of our 2021 report.

Green text represents a positive environmental impact; red text represents a negative environmental impact

The COVID-19 pandemic severely impacted Caltrain's operations. This led to a significant drop in ridership and accompanying service which resulted in reduced fuel usage but also decreased displaced emissions.

CALTRAIN RIDERSHIP AND OPERATIONS



Ridership and Operations

In the recent past, Caltrain's ridership was primarily comprised of professionals commuting to tech jobs. When California prudently responded to COVID-19 with shelter-in-place orders, Silicon Valley tech companies moved their operations online so that home-bound employees could continue to work. This trend depressed Caltrain ridership, which dropped by 95% in the initial months of the pandemic. Overall FY2021 train boardings decreased by approximately 91% compared to FY2020 and passenger miles traveled (PMT) decreased by nearly 91% in this same timeframe (**Figure 1** and **Figure 2**). Though it remained operational throughout COVID-19, Caltrain service was reduced during weekdays in response, which caused a 10% decline in train miles between FY2020 and FY2021 (**Figure 3**).

This loss of ridership is not only detrimental to Caltrain but to the entire Bay Area, whose residents rely on Caltrain to reduce air pollutants and GHG emissions from transportation. Caltrain significantly contributes to reductions in regional GHG emissions by displacing more emissions than it emits. Immediately prior to COVID-19 (FY2019), Caltrain removed approximately 1.5 pounds of GHG emissions per boarding by displacing emissions that would have occurred if the trip were taken in a single-occupancy vehicle. The COVID-19 pandemic severely reduced ridership. Net GHG emissions increased in FY2022 as a result of ongoing COVID-19 ridership impacts and Caltrain service increases that occurred between FY2021 and FY2022. This combination of factors reduced the amount of displaced emissions and led to an overall increase in net GHG emissions for FY2022.

However, ridership steadily increased from FY2021 through FY2022, though numbers are still far below pre-pandemic numbers. Train boardings and PMT both increased by over 200% (**Figure 1** and **Figure 2**), and train miles rose by over 34% in FY2022 compared to FY2021 (**Figure 3**). As a result of easing COVID-19 impacts and more hybrid work arrangements, displaced emissions are assumed to have increased by approximately 200% between FY2021 and FY2022. As ridership continues to return, the emissions that Caltrain displaces will continue to benefit regional air quality.

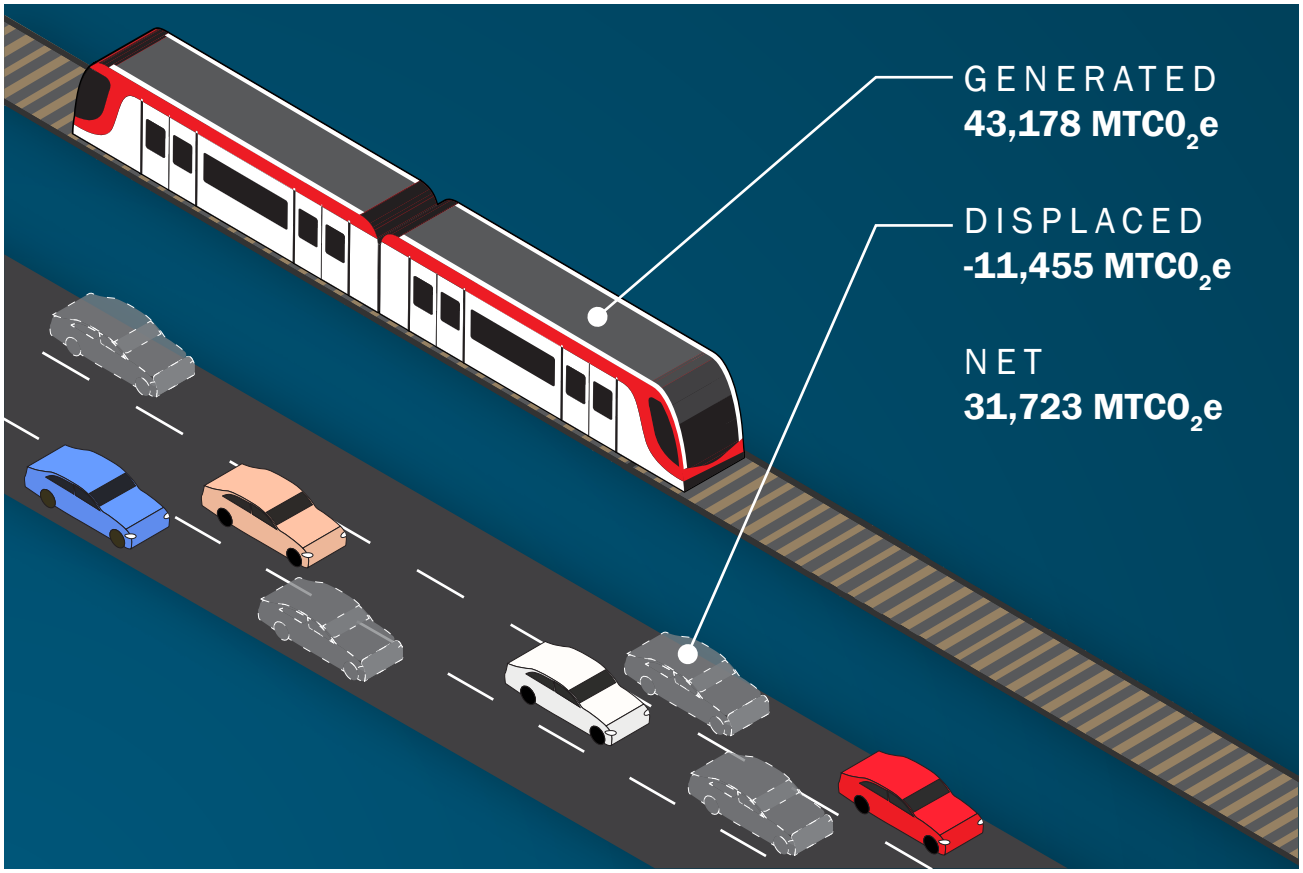


Figure 1: Total Annual Unlinked Passenger Trips (UPT)[2]

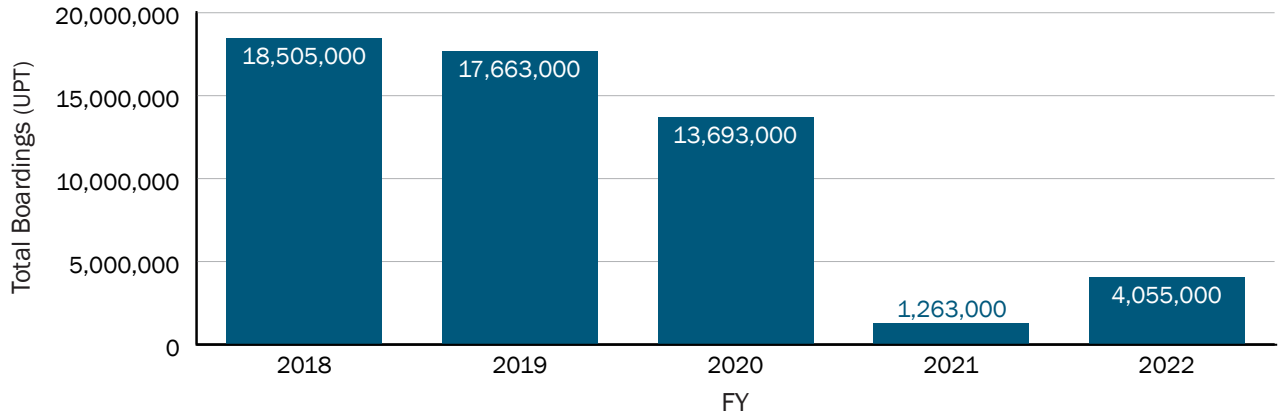


Figure 2: Total Annual Passenger Miles Traveled (PMT)[3]

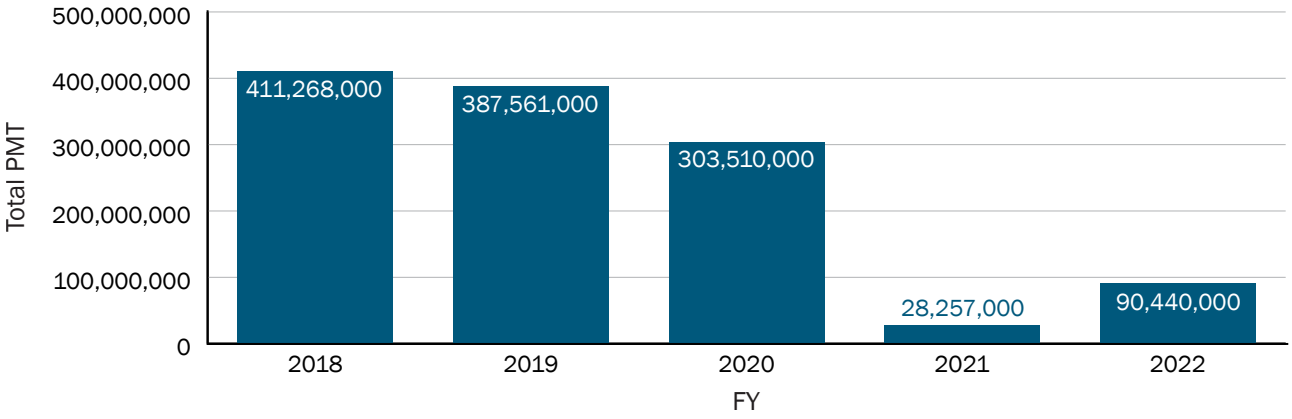
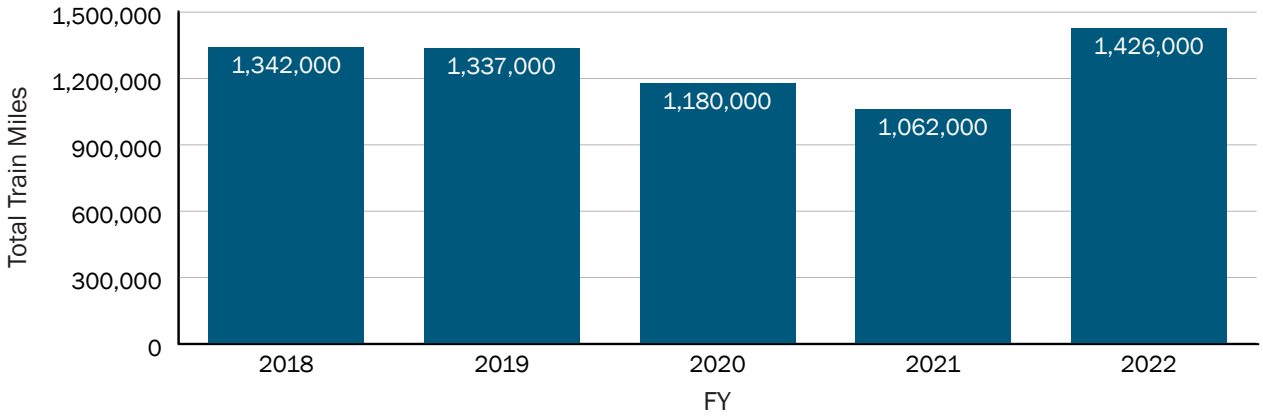


Figure 3: Total Annual Train Miles[4]



[2]Boardings used for normalization represent train boardings only and exclude boardings on Caltrain-operated shuttles. Data is from Federal Transit Administration, National Transit Database, FY2018 to FY2022 Reporting.

[3]Passenger miles traveled used for normalization represent train and shuttle mileage. Data is from Federal Transit Administration, National Transit Database, FY2018 to FY2022 Reporting.

[4]Data is from Federal Transit Administration, National Transit Database, FY2018 to FY2022 Reporting.

DIVERSITY AND EQUITY

Diversity and Equity

Environmental Justice refers to the need to reduce disparities in environmental protections which have historically led to underserved communities disproportionately suffering environmental harm. With this in mind, Caltrain seeks to ensure that the environmental benefits of its service are shared equally throughout the communities it serves utilizing its equity policy framework that was developed in 2020. Caltrain works to advance equity by increasing inclusion in transportation planning processes, delivering environmental benefits to underserved communities, and encouraging ridership that helps reduce GHG emissions. A few examples are summarized below.

Equity Policy Framework

In 2020, the *Caltrain Framework for Equity, Connectivity, Recovery, and Growth* was developed to provide guidance to staff and transparency to the public.[xvii] The framework was based on detailed technical analysis conducted by Caltrain and its partner agencies as part of the Caltrain Business Plan process during 2018, 2019, and 2020. The framework outlines the principles, policies, and actions for Caltrain to urgently pursue to help the region address the interrelated and compounding crises of the COVID-19 pandemic and longstanding systemic inequality and racism, providing guidance for navigating near- and mid-term challenges while incrementally advancing toward its Long Range Service Vision.

Translation and Interpretation Services

The District follows a comprehensive Language Assistance Plan, created as part of the Caltrain Title VI Program. One critical concern addressed by Title VI is the language barrier that Limited English Proficiency (LEP) persons face regarding accessing information about using transit services. Given the diversity of San Mateo County's population, it is critical to provide language assistance. The Language Assistance Plan provides language assistance for LEP persons and operates alongside the public participation process to ensure that members of limited English populations are reached.

Assessment of Equity-Related Social Sustainability Metrics

In 2022, Caltrain launched a review of equity-related social sustainability metrics to determine potential metrics that could be integrated into future sustainability reporting. Doing so can help Caltrain measure impacts to the public from transportation, transportation access, opportunity, and diverse representation in transit riders. Review of potential metrics was conducted through the lens of the *Caltrain Framework for Equity, Connectivity, Recovery, & Growth*. As Caltrain continues to embed equity throughout the organization, including equity metrics within the sustainability reporting process, it can support the agency's overall equity goals while more holistically considering the human element of sustainability.

Free and Reduced Fare During COVID-19

Caltrain introduced six fare reductions between 2020 and 2022, including discounted fares through June 2025 and free fares to vaccination sites on its corridor. These promotions worked to encourage ridership while helping to implement Caltrain's 2020 *Caltrain Framework for Equity, Connectivity, Recovery, & Growth*, and provided access to essential services during the global COVID-19 emergency.

Clipper START

Caltrain also offers 50% off one-way fares for low-income residents through the Clipper START program.[xviii] This is a pilot program managed by Clipper, the Bay Area transit fare card operated by the Metropolitan Transportation Commission. Clipper START provides single-ride transit fare discounts for eligible low-income individuals across the Bay Area. Interested applicants must provide age, residency, and income information and then discounts are applied whenever eligible participants use their personalized Clipper card, making cost savings easy to access.

Caltrain Pass-Forward Program

The Pass-Forward Program (formerly known as the Go Pass Donation Program) began in 2021 to diversify ridership and increase access to the Caltrain system. In the program, Go Pass subscribers may donate unused passes to a network of qualified community-serving organizations (CSOs). Recipients of the donated Go Passes can ride Caltrain an unlimited amount of times at no personal cost over the course of the calendar year. The program seeks to help traditionally under-represented groups – such as essential workers, low-income riders, and those living in equity-priority communities – bypass economic barriers to using Caltrain. Donated passes from employers reduce recipients' travel cost and may increase their job opportunities as their range of travel increases. There are currently 19 CSOs participating in the program, with more anticipated in the future.

Transit Oriented Development Funding

The California Strategic Growth Council has approved grants to fund five affordable housing projects supported by Caltrain. The grant was designed to fund collaboration between transit agencies and affordable housing developers. Transit-oriented development produces a range of environmental benefits including reduction of transit-associated GHGs, increased walkability, and more as affordable housing produces a range of equity benefits. Transit-oriented development combines affordable housing and transit-oriented development to locate below-market rate housing alongside transit, reducing the need for car ownership and travel.

Michelle Bouchard Named Executive Director

Bouchard has worked at Caltrain for more than 20 years and has over 25 total years of experience in the transit industry. Bouchard previously served in several roles at Caltrain, including Director of Rail Transportation and Chief Operating Officer. In this appointment, Michelle became one of a handful of women heading one of the public rail systems in the US.

CALTRAIN SUSTAINABILITY PERFORMANCE

Highlights

Air Quality

Energy Use

Water Use

Waste and Diversion

Highlights

200%

Displaced 200% more GHG emissions between FY2021 and FY2022

100% Renewable

Caltrain facilities powered by 100% renewable and GHG-free electricity

-20%

Water consumption decreased by 20% between FY2021 and FY2022

Caltrain Debuts its First Electric Train

Since the last Sustainability Report, Caltrain accomplished several key milestone tasks in the Peninsula Corridor Electrification Project, shown in Figure 4, including the following:

- Installation of overhead contact systems that provide energy to future electric trains as well as transformers that will power the electrified corridor
- Upgrade of the signaling system
- Completion of full-speed testing of the high-performance trainsets at the FRA's Transportation Technology Center (TTC) in Pueblo, Colorado
- Assembly of seventy-three electric train cars at the Salt Lake City, Utah, manufacturing facility made possible by the project

In September 2022, Caltrain representatives were joined by dozens of federal, state, regional, and local officials as well as community members to celebrate the first public viewing of the agency's new electric train cars, shown in Figure 5. As of 2022, four new electric trainsets have arrived at Caltrain, enabling a critical testing period on the corridor.

Figure 4: Caltrain Electrification Schedule

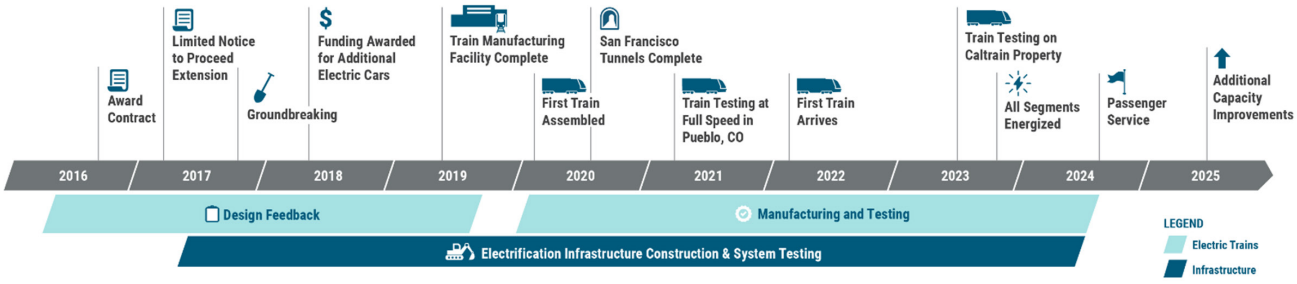


Figure 5: Caltrain First Electric Train Celebration, 2022

Electrification of the Caltrain corridor will deliver significant environmental benefits to the communities Caltrain serves. As 75% of the Caltrain locomotive fleet is electrified, diesel use will fall substantially, significantly reducing Caltrain's GHG emissions. Electrification will also dramatically reduce particulate matter pollution caused by the aging diesel engines, which is both a climate and public health hazard. Additionally, trains will be quieter, reducing noise pollution.

First Green Bonds Issuance

In February 2022, the JPB issued $140 million in Measure RR Sales Tax Revenue Bonds (Green Bonds – Climate Bond Certified) Series A to fund costs associated with the PCEP Project. This marks the first bond issued by Caltrain that specifically commits the use of funds towards addressing climate change.

Improved Bicycle Infrastructure

In 2021, Caltrain installed over three hundred bicycle lockers across 19 stations at a cost of $3 million. Caltrain is committed to multi-modal transit and encourages zero-emission active-transportation such as bicycling or walking for last-mile trips. Caltrain proactively seeks to improve its service for bicycle commuters and other passengers using active transportation through its bimonthly Bicycle and Active Transportation Advisory Committee.

Air Quality

GHG Emissions

Caltrain directly generates GHG emissions through the operation of its revenue fleet (i.e., locomotives and shuttles), which is currently powered by diesel fuel, gasoline, and a small amount of other fuels (e.g., compressed natural gas). Caltrain generates a small amount of indirect GHG emissions from waste disposal and water consumption.

Caltrain also "displaces" emissions that would have occurred if travelers chose to travel by private automobile and calculates these as "avoided emissions." **Figure 6** shows Caltrain's GHG emissions by sector. Emissions from diesel fuel represent the vast majority of GHG emissions.

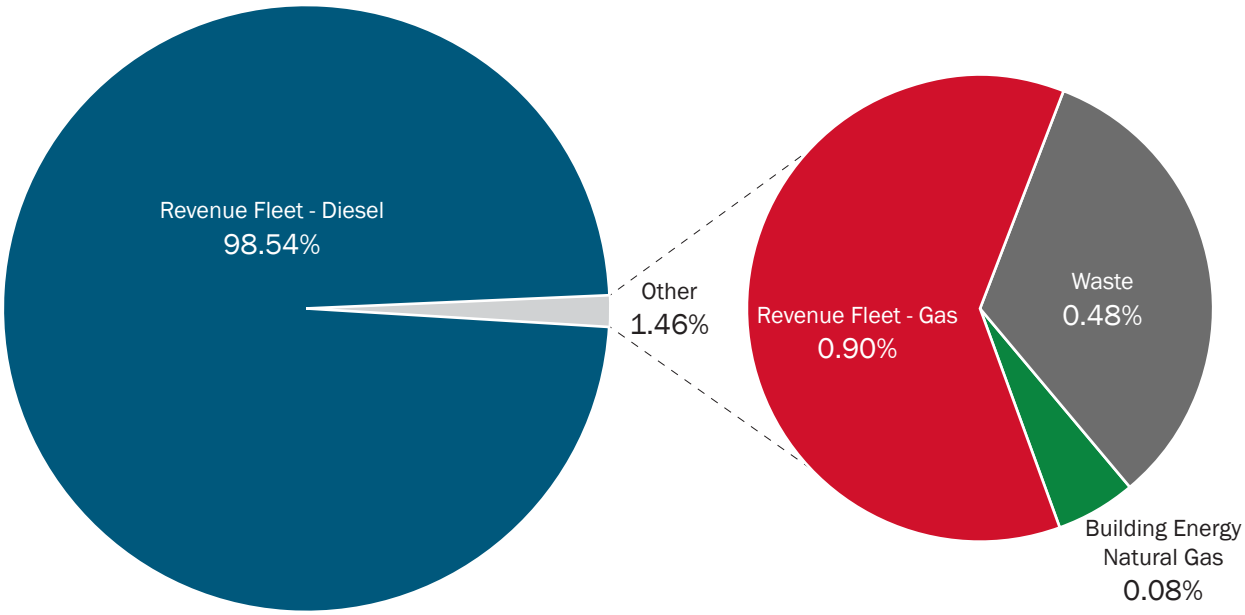
Caltrain's net GHG emissions are calculated as generated emissions minus displaced emissions, consistent with APTA guidance.[6] **Figure 7** shows a line graph of Caltrain's net GHG emissions and generated and displaced emissions for each fiscal year.

In FY2021 and FY2022, Caltrain generated approximately 34,341 and 43,178 $MTCO_2e$, respectively. Generated emissions declined approximately 15% between FY2020 and FY2021 largely due to a corresponding 10% reduction in train miles. During this same timeframe, Caltrain displaced approximately 91% fewer GHG emissions due to a 91% decrease in PMT due to COVID-19.

Between FY2021 and FY2022, ridership began to increase and displaced emissions increased threefold. The Peninsula Corridor Electrification Project (PCEP) will initially transition 75% of the fleet from diesel to electric by 2024 and, once complete, will eliminate the majority of generated GHG emissions as the electrified trains will be powered by GHG-free electricity.

Figure 8 shows net GHG emissions per boarding. In FY2021, ridership dropped by over 90%, which caused a net positive spike in net GHG emissions per boarding. This is because fewer riders were taking the train while Caltrain increased service between FY2021 and FY2022, and therefore each rider had higher per-person emissions associated with their trip. As ridership recovered in FY2022, net GHG emissions per boarding declined to 17.3 pounds of emissions with each train trip.

Figure 6: FY2022 GHG Emissions by Sector ($MTCO_2e$ per Year)[5]



[5]No emissions from water have been generated since FY2020. All values are rounded to the nearest whole number.
[6]Caltrain follows APTA's benefits calculation in Section 6 of the following: https://www.apta.com/wp-content/uploads/Standards_Documents/APTA-SUDS-CC-RP-001-09_Rev-1.pdf

Figure 7: GHG Emissions - Generated, Displaced and Net ($MTCO_2e$)

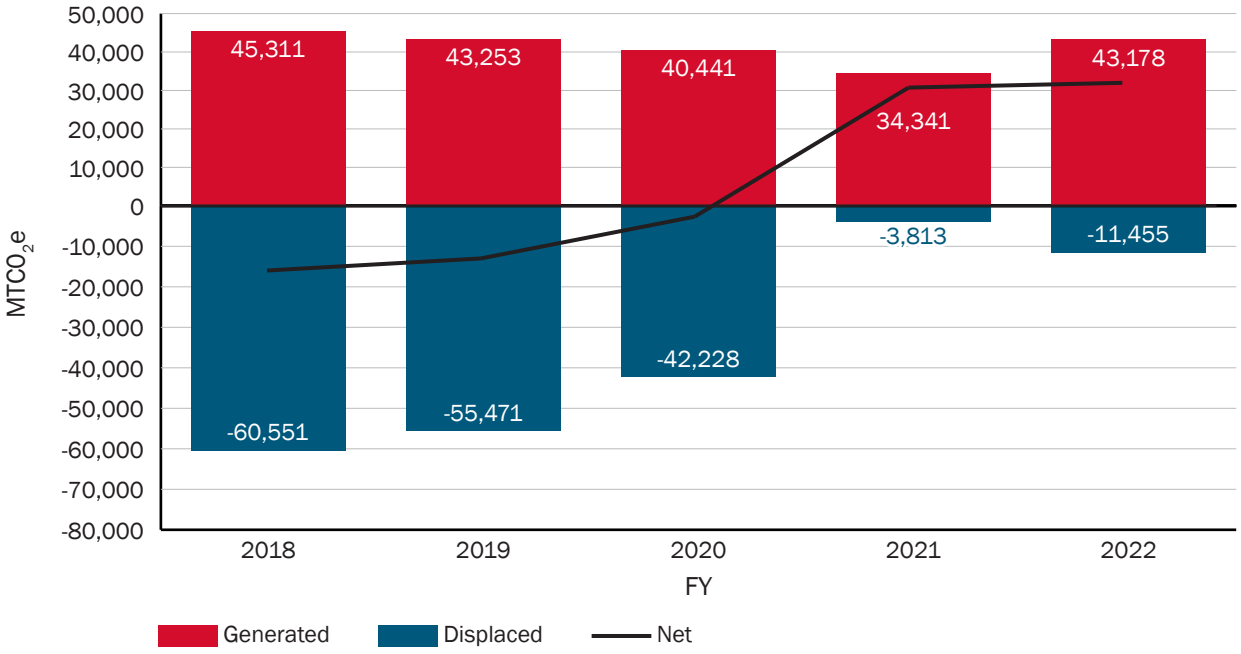
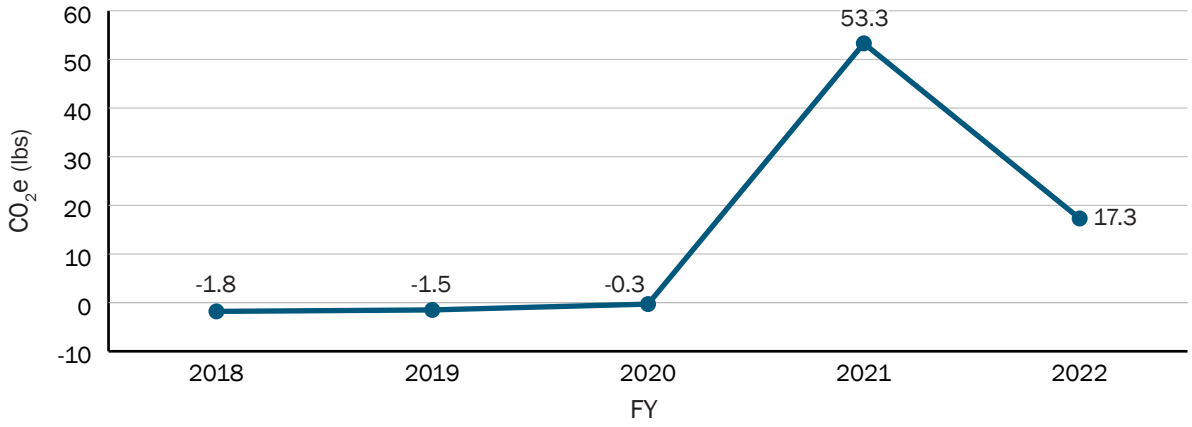


Figure 8: Net GHG Emissions per Boarding (lbs.)



Criteria Air Pollutants

Criteria air pollutants (CAPs) include pollutants that cause smog and acid rain, such as particulate matter, ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead.[xix] These pollutants have been linked to negative health effects such as asthma, cardiovascular conditions, and cancer. Caltrain's current fleet emits CAPs when it burns fossil fuels like diesel but, as noted earlier, Caltrain service also displaces CAPs that would otherwise have been emitted if passengers had chosen to drive alone instead of taking public transit. Nearly all Caltrain's CAPs are emitted from the diesel-powered locomotives, which will be substantially reduced once 75% of the fleet has been electrified.

In **Figure 9**, the net generation in CAPs is shown in a line graph, where the generated and displaced CAPs are shown in bars above and below the line. Generated CAPs increased by about 27% from FY2021 to FY2022. During the same time period, net CAPs increased by 21% as more CAPs were generated while displaced emissions continued to rebound from reduced ridership levels.

Figure 10 shows Caltrain's generated CAP emissions normalized by boardings. As ridership recovered between FY2021 and FY2022, CAPs per boarding declined by 61%.

Figure 9: Criteria Air Pollutants - Generated, Displaced, and Net (grams)

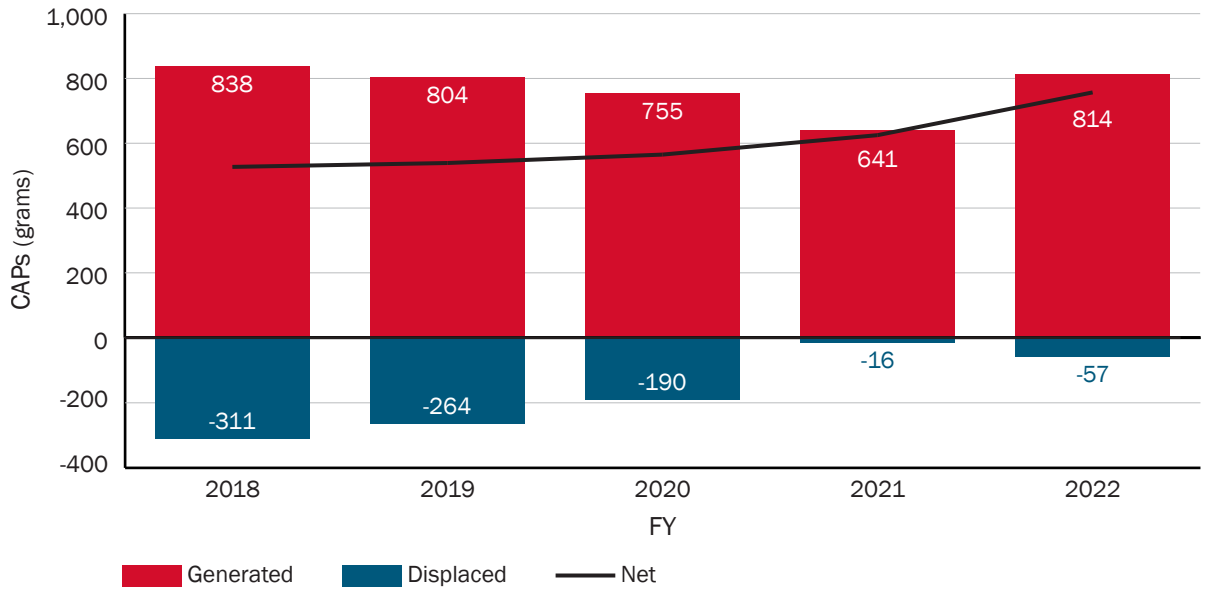
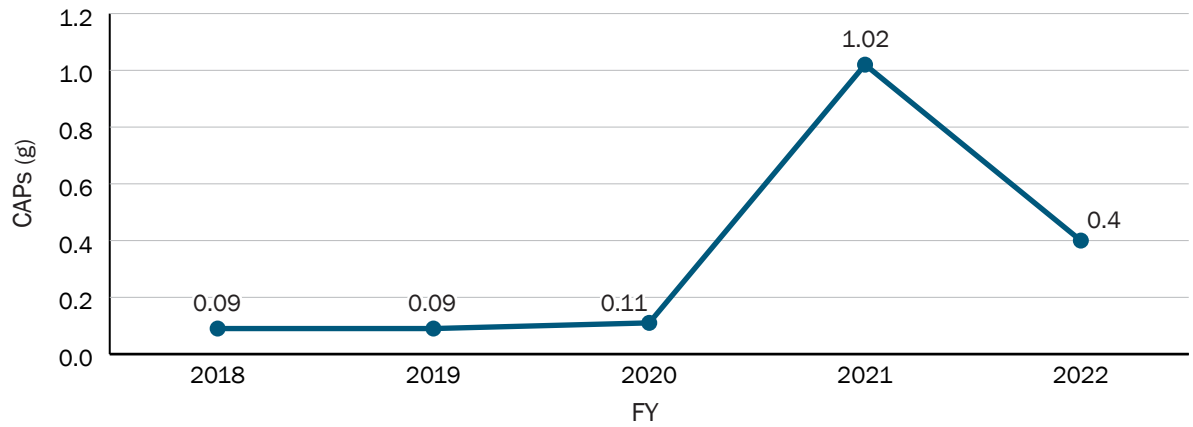


Figure 10: Criteria Air Pollutants Generated per Boarding



Energy Use

Revenue Fleet

Caltrain's revenue vehicle fleet operates on diesel and gasoline. Currently, commuter rail (i.e., Caltrain trains) uses only diesel fuel, though the PCEP modernization of the corridor will initially transition 75% trains to electric beginning in 2024 with the eventual goal of fully transitioning to 100%. Only ultra-low sulfur diesel is used in Caltrain operations, in compliance with California fuel standards.

Energy use by fleet vehicles makes up 96% of Caltrain's overall energy use, as measured in thousand British thermal units (kBTU). As shown in **Figure 11**, diesel fuel in locomotives accounts for approximately 99% of the fuel used by the Caltrain revenue fleet, with more than 4.1 million gallons consumed in FY2022 (**Figure 12**). Caltrain shuttle operations predominantly use gasoline and have not used CNG since FY2019.

As shown in **Figure 12**, fuel consumption increased by 27% between FY2021 and FY2022 as a result of vehicle miles increasing by 34%.

Figure 13 shows revenue vehicle energy use per boarding in kBTU, which reflects energy efficiency per passenger. Revenue vehicle energy use per boarding increased over 800% between FY2020 and FY2021 as ridership dropped dramatically during COVID-19. However, ridership began to increase between FY2021 and FY2022, decreasing the energy use per boarding.

Figure 11: FY2022 Revenue Fleet Energy Use by Source (gallons)

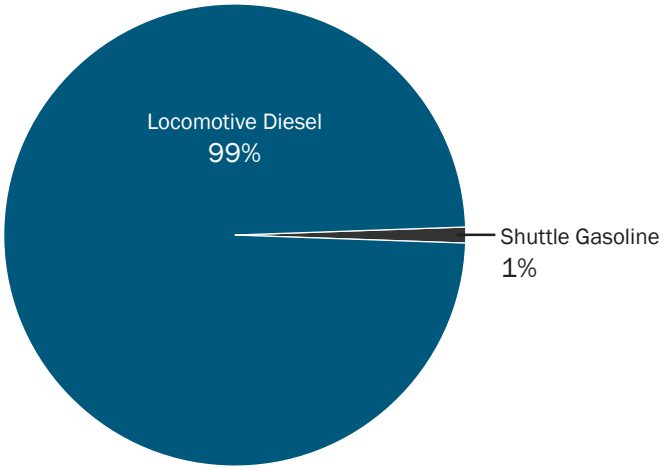
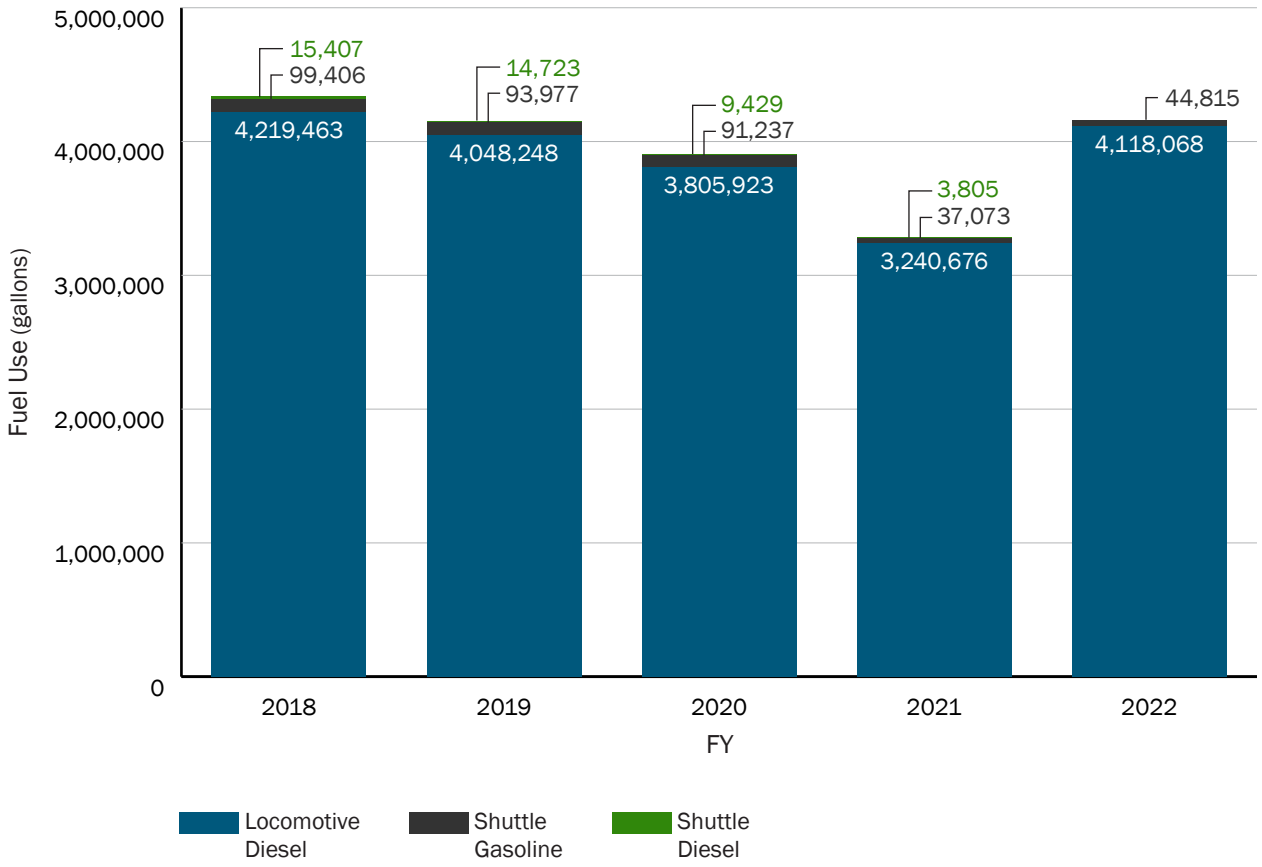
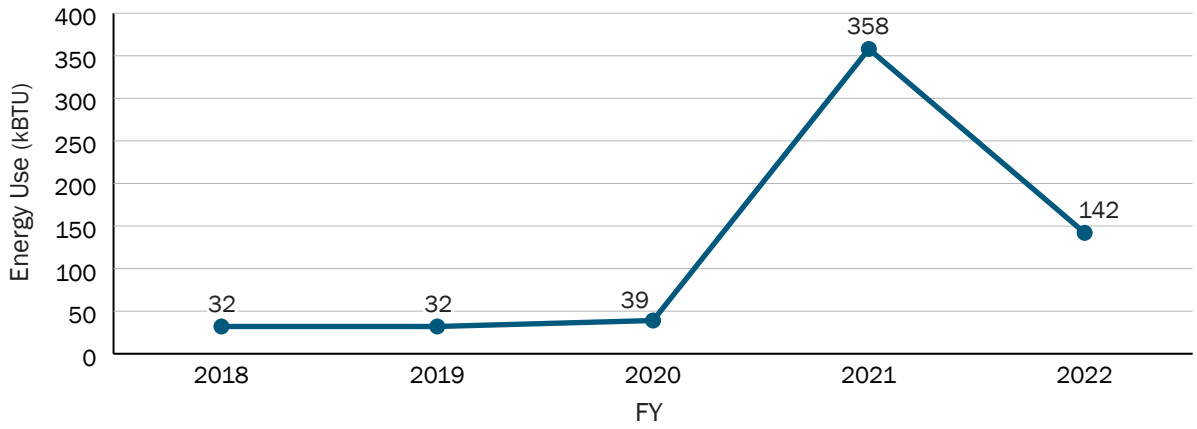


Figure 12: Fuel Use by Type (gallons)*



*CNG shuttle emissions are de minimus and not displayed in the above figure.

Figure 13: Revenue Vehicle Energy Use per Boarding (kBTU)



Facilities

Caltrain uses electricity for lighting, equipment, and amenities at its stations, Centralized Equipment Maintenance and Operations Facility (CEMOF), Central Control Facility (CCF), and signals along the right-of-way. CEMOF, CCF, and a few Caltrain stations use small quantities of natural gas for space heating. In addition, Caltrain administration operates out of the Central Administrative Offices (Central) located in San Carlos. Energy use and emissions associated with the San Carlos building, which is owned by the San Mateo County District, are included in the SamTrans sustainability inventory and report.

Consequently, energy use by Caltrain facilities represents a small share of the total energy consumed by Caltrain. Facility energy use made up only 4% of Caltrain's total energy use in FY2022. During FY2022, Caltrain purchased 5.70 million kWh of electricity and 6,463 therms of natural gas in 21 cities, equivalent to over 20 million kBTU for both resources.

Figure 14 shows total facility energy usage in kBTU. Between FY2021 and FY2022, electricity and natural gas usage decreased by approximately 5% and 81%, respectively. However, this decrease in natural gas usage is the result of returning to normal usage following a substantial increase in FY2021 related to a boiler maintenance issue at CEMOF. Resulting regular inspections and preventative maintenance have ensured continued reductions. As of FY2020, 100% of Caltrain's electricity is GHG-free and renewable. Electricity consumption will significantly increase as Caltrain transitions 75% of the rolling stock to electric beginning in 2024. More information about this effort is available under the **Looking Ahead** section.

Figure 15 shows facility energy use per boarding in kBTU. Between FY2020 and FY2021, energy use per boarding increased drastically due to the decline in ridership during COVID-19 and then decreased by nearly 74% between FY2021 and FY2022 as ridership recovered.

Figure 14: Facility Energy Use (kBTU)

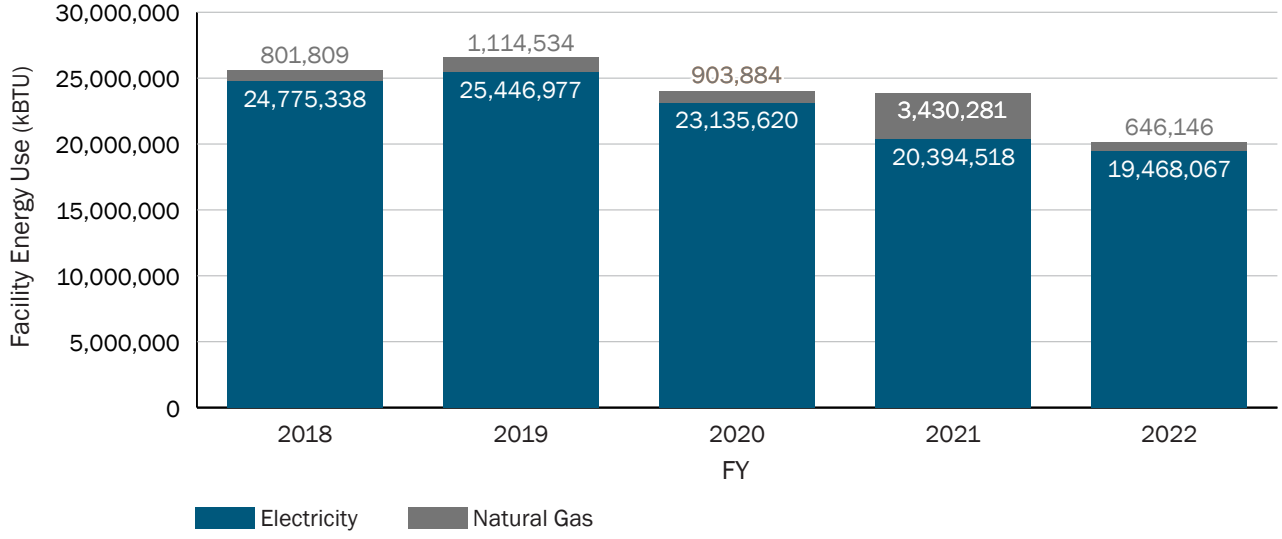
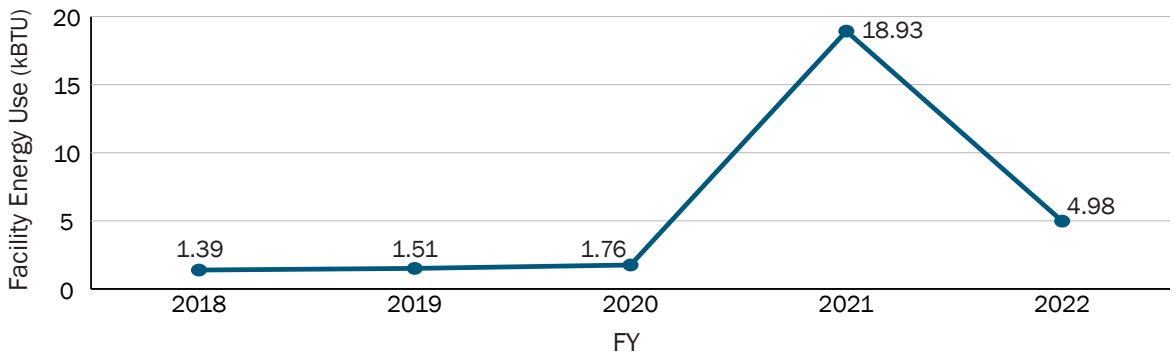


Figure 15: Facility Energy Use per Boarding (kBTU)

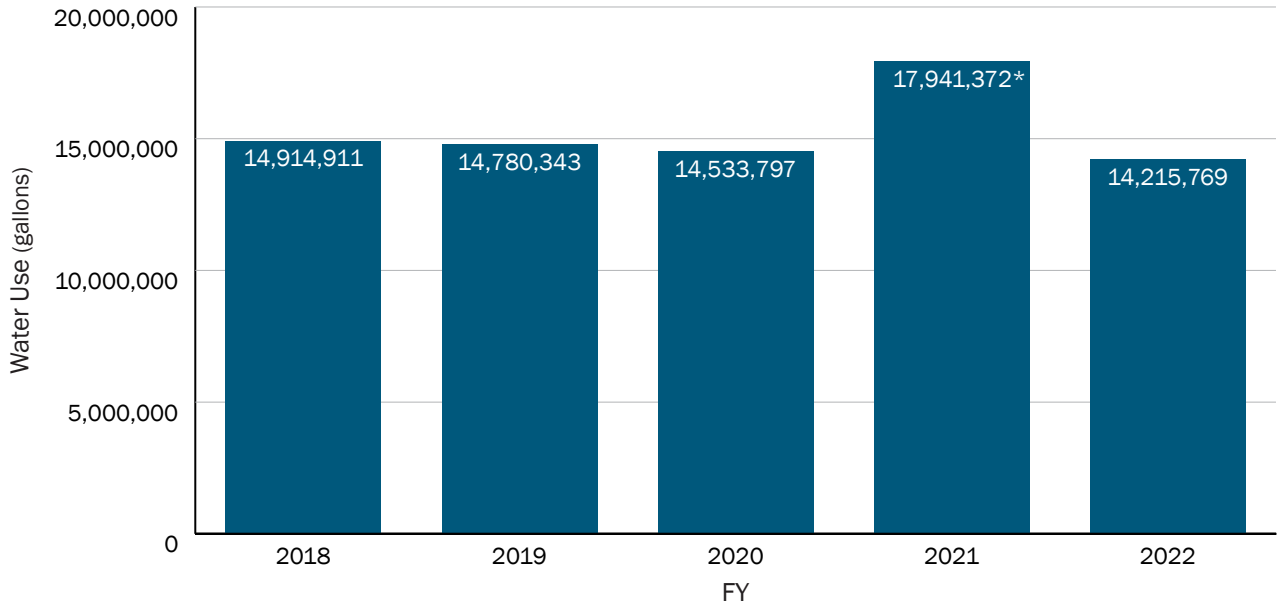


Water Use

Caltrain uses water for irrigation of outdoor landscaping at its stations, train washing at CEMOF, restroom facilities on trains, and indoor uses such as passenger and employee restrooms and crew showers at select stations. Caltrain minimizes water use wherever possible. Emissions are generated indirectly through the combustion of fossil fuels in electricity generation that provides electricity for water delivery, conveyance, and treatment. Although Caltrain does not directly control these emissions, they are included in this inventory because any emissions are a consequence of Caltrain's use of the water.

Figure 16 shows Caltrain's total water usage per year. Caltrain consumed nearly 18 million gallons of water in FY2021 and over 14.2 million gallons of water in FY2022.

Figure 16: Total Annual Water Consumption (gallons)



*The higher amount of water consumption on FY2021 in the above figure is likely the result of a metering issue.

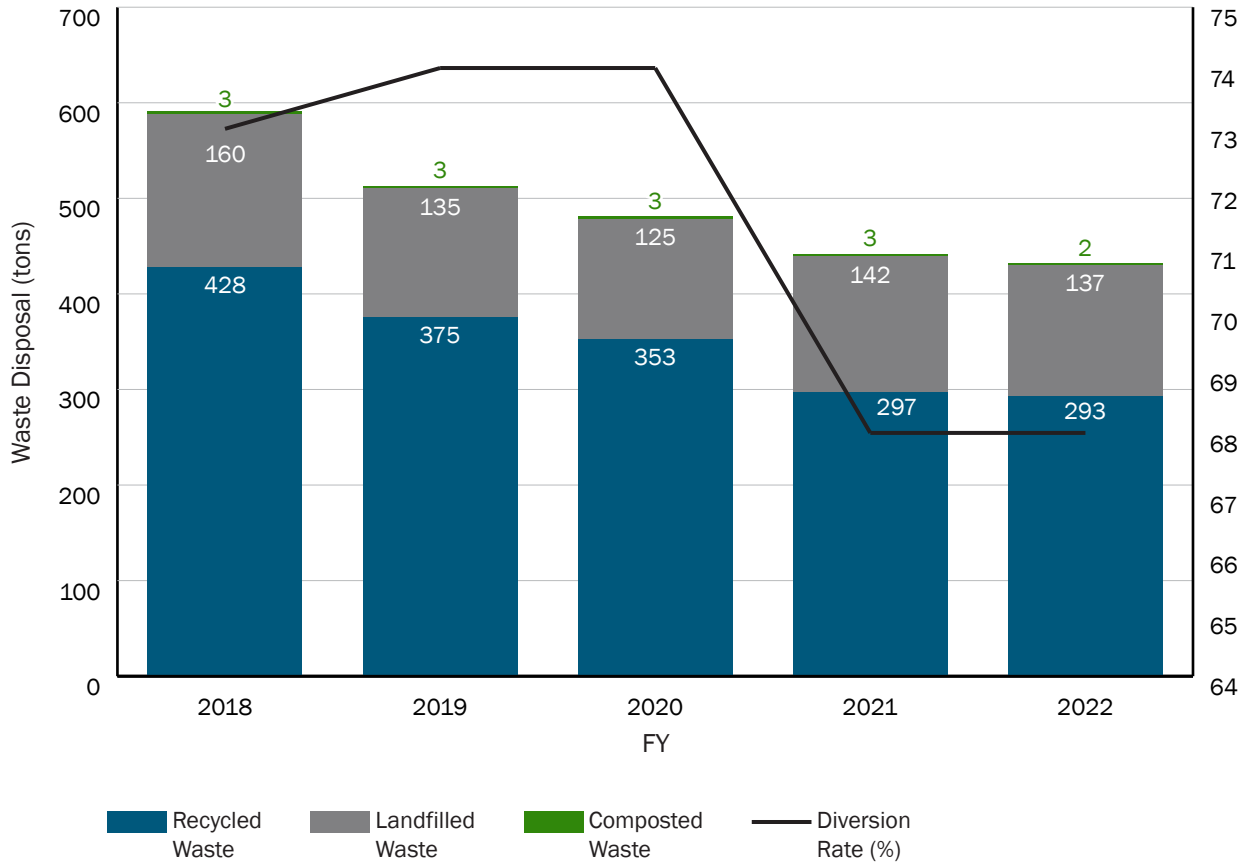
Waste and Diversion

Caltrain-generated waste consists of municipal waste from passengers (paper, food scraps, bottles, cans, and other common recyclables) and employees (typical office activities and select low-impact maintenance activities). Emissions from waste sent to landfill are included in this inventory, but industrial waste (such as hazardous waste and large metal scrap recycling), construction, and demolition waste are accounted for by the construction company performing the work, and consequently are not included in the graph below.

The waste and diversion (recycling and composting) rates are estimated through invoices from Caltrain's waste service providers. In select cases, Caltrain's waste service provider can provide information on landfill, recycling, and organics collection by weight. For all other cases, Caltrain assumes that all landfill, recycling, and organics collection containers are 80% full when collected each week for the purposes of this inventory.

Figure 17 shows total landfilled, recycled, and composted waste per fiscal year. The total diversion rate, measured as the percentage of total waste diverted as recycling or compost, is shown as a black line. Caltrain's total generated waste decreased by approximately 10% between FY2020 and FY2022 and the agency's diversion rate decreased by 8%, due to lower ridership at stations (waste at the Central facility remained about the same).

Figure 17: Waste Disposal by Type (tons)



LOOKING AHEAD

Looking Ahead

Next Stop: Electrified Service!

Caltrain's ambitious schedule to electrify 75% of the fleet by 2024, as displayed in **Figure 4**, may be complete by its next sustainability report. This project not only furthers regional and state GHG reduction goals, but this collaborative effort to develop the new Caltrain electric trains and electrification infrastructure is also creating nearly 33,000 jobs in California and across the country, as shown in **Figure 18**. For more information on the Electrification project, click **here**.

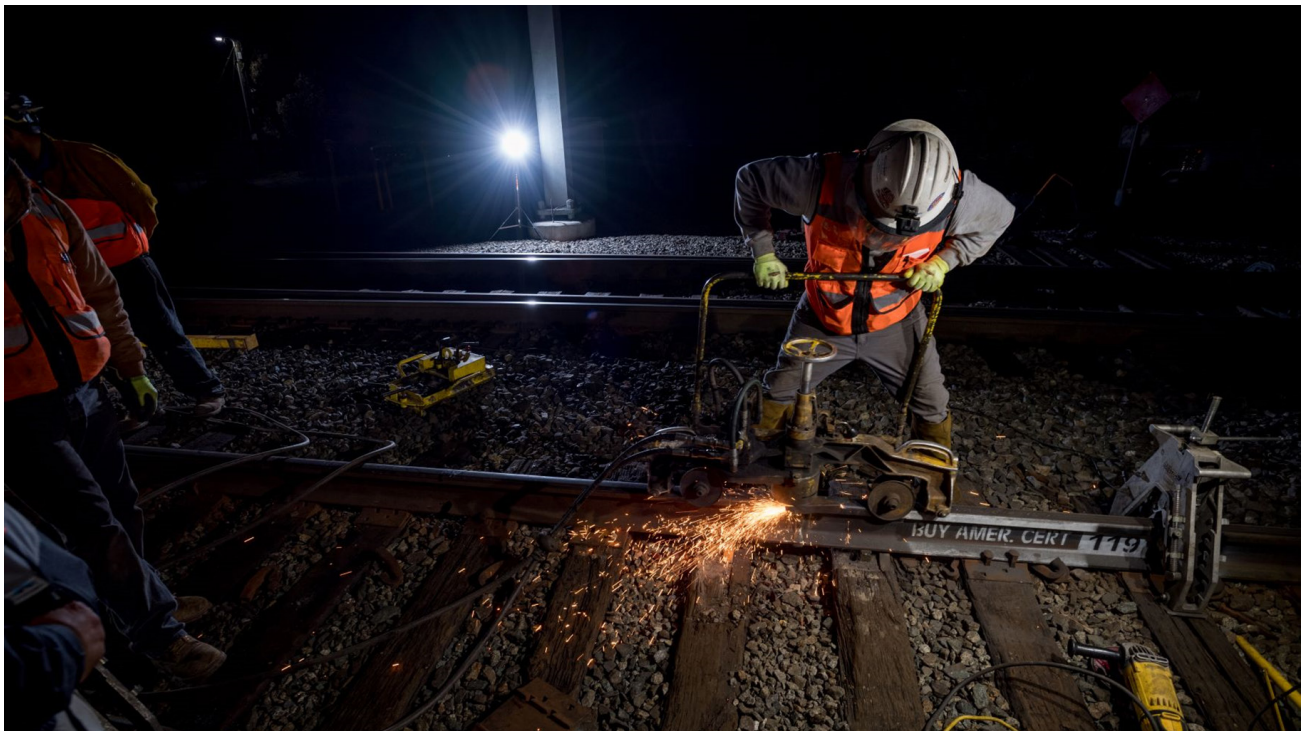
Caltrain Strategic Sustainability Plan

Caltrain will be undertaking an analysis of its sustainability program, seeking feedback from stakeholders as to how the Sustainability Program can best serve Caltrain's electrified corridor. Electrification will dramatically reduce GHG emissions and CAPs on the corridor. The Caltrain Strategic Sustainability Plan will provide direction as to where Caltrain will focus its sustainability program next.

Caltrain Climate Vulnerability Assessment

Caltrain's infrastructure and assets were battered and flooded by a series of intense storms at the end of 2022. These storms disrupted service, damaged recently built electric infrastructure, and flooded facilities. With the knowledge that intensifying climate change will only worsen future storms and storm damage, Caltrain is seeking funds to study and understand the scope of the vulnerability of its assets and passengers to physical impacts from climate change.

Figure 18: Caltrain Electrification Track Work



Data Sources and Methodology

See the Caltrain Sustainability Inventory Technical Report (internal document) for more information on data sources and methodologies applied.

[i]Calculated locomotive emission factors using emission factors taken from Table B2-20 of the Peninsula Corridor Electrification Project Final Environmental Impact Report, which uses emission factors from EPA's locomotive emission factors assuming an efficiency of 20.8 bhp-hr per gallon (Caltrain 2015, EPA 2009). For this inventory, NOX and PM10 emission factors have been adjusted by a factor of 0.94 and 0.86, respectively, to account for use of California ultra-low sulfur diesel fuel per Table 11-3 and 11-4 in CARB's Carl Moyer Guidelines (CARB 2011).

[ii]GHG emission displacement calculations based on APTA mode shift calculation [displaced/avoided trips (VM) = PMT (miles) x 0.44], EMFAC 2014 emissions factors, and EMFAC 2007 vehicle categories.

[iii]Generated emissions less displaced/avoided emissions.

[iv]Calculated locomotive emission factors using emission factors taken from Table B2-20 of the Peninsula Corridor Electrification Project Final Environmental Impact Report, which uses emission factors from EPA's locomotive emission factors assuming an efficiency of 20.8 bhp-hr per gallon (Caltrain 2015, EPA 2009). For this inventory, NOX and PM10 emission factors have been adjusted by a factor of 0.94 and 0.86, respectively, to account for use of California ultra-low sulfur diesel fuel per Table 11-3 and 11-4 in CARB's Carl Moyer Guidelines (CARB 2011).

[v]Calculated displaced/avoided emissions based on APTA mode shift calculation [displaced/avoided trips (VM) = PMT (miles) x 0.44], EMFAC 2014 emissions factors, and EMFAC 2007 vehicle categories.

[vi]Total net CAPs calculated by taking generated CAPs less displaced/avoided CAPs.

[vii]Electricity data collected from PG&E, Silicon Valley Power, and the City of Palo Alto Utilities.

[viii]Natural gas data collected from PG&E.

[ix]Standard conversion factors used to convert kWh and therms to kBTU to calculate total energy use.

[x]Data collected from the Federal Transit Administration (FTA) National Transit Database (NTD).

[xi]Ibid.

[xii]Ibid.

[xiii]Standard conversion factors used to convert all fuels to kBTU.

[xiv]Water use data for 21 cities along Caltrain corridor.

[xv]Waste and diversion data collected from Recology and Republic Services invoices and/or waste data. Gallons converted to pounds using San Francisco Department of Environment (SFDOE) calculator; cubic yards converted to tons using California Department of Resources Recovery and Recycling (CalRecycle) conversion factors.

[xvi]Ibid.

[xvii]Caltrain. (2020). *Caltrain Framework for Equity, Connectivity, Recovery, & Growth.* https://www.caltrain.com/media/2071/download?inline

[xviii]https://www.clipperstartcard.com/

[xix]US Environmental Protection Agency. (2023, July 20). *Criteria Air Pollutants.* https://www.epa.gov/criteria-air-pollutants

Caltrain®