SamTrans 2019 Sustainability Report

samTrans

Table of Contents

Acronym List

ACS	American Community Survey
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
CNG	compressed natural gas
COA	Comprehensive Operational Analysis
CO_2	carbon dioxide
EMFAC	Emissions Factor Database
FY	fiscal year
JPB	Peninsula Joint Powers Board
GHG	greenhouse gas
kBTU	thousand British thermal units
kWh	kilowatt hours
MTC	Metropolitan Transportation Commission
$MTCO_2e$	metric tons of carbon dioxide equivalent
SamTrans	San Mateo County Transportation District
SFMTA	San Francisco Municipal Transportation Agency
TA	San Mateo County Transportation Authority
VM	Vehicle Miles
VTA	Santa Clara Valley Transportation Authority

Executive Summary

SamTrans' first sustainability report was released in 2017, since then SamTrans has continued to make significant strides toward fulfilling its vision to be a sustainable, equitable mobility leader. SamTrans' Sustainability Report is an evaluation of the agency's sustainability performance across all resource use. Table 1 summarizes SamTrans' performance since the last report. **SamTrans' commitment to sustainability and adopting best practices in resource management has enabled the agency to reduce generated greenhouse gas (GHG) emissions by 9% over the last two years.**

SamTrans has steadily improved environmental sustainability performance through a number of initiatives. First, in 2016, SamTrans enrolled in California's Community Choice Energy (CCE) program and, in 2017, voted to source 100% of the District's energy from renewable sources through the CCE program. Second, SamTrans continues to increase the efficiency of light fixtures and other electric appliances at all facilities and has **reduced electricity usage by approximately 5% across all facilities.**

Diesel use by revenue and non-revenue vehicles has also decreased over the last two years. Since 2016, the District has reduced diesel usage by 6.5%. This reduction, which exceeds a slight reduction in the agency's total vehicle miles (VM) over the same period, has helped **the agency achieve a 14% reduction in generated criteria air pollutants (CAPs) over the last two years.**

SamTrans introduced composting service at the Central office in 2015, and in 2017 introduced the program to the North Base, South Base and Brewster facilities. At the same time, SamTrans upgraded waste bins and signage. **The initiative has helped to increase SamTrans' diversion rate by more than 20 percentage points.**

SamTrans Vision: The District is a mobility leader, providing transportation choices and a sustainable future that meets the needs of our diverse communities.

However, as with most other transit agencies in the United States today, SamTrans has struggled with declining ridership due to various factors. This has resulted in nearly a 27% reduction in displaced GHG emissions. Recently launched initiatives like *Reimagine SamTrans*, a Comprehensive Operational Analysis (COA) funded through Measure W, will help the agency to meet the challenges presented by a new mobility landscape.

In April of 2018, the District's continued achievements in sustainability were recognized with Silver level recognition by the American Public Transportation Association.

Table 1: SamTrans Sustainability Performance Summary FY2016 to FY2018

Indicator	Unit	2016	2017	2018	FY16 to FY18 Change
Greenhouse Gas Emissions					
Generated	$MTCO_2e$	31,015	30,904	28,231	-9.0%
Displaced/Avoided	$MTCO_2e$	-9,328	-7,593	-6,854	-26.5%
Net Total[1]	$MTCO_2e$	21,687	23,310	21,377	-1.4%
Criteria Air Pollutant Emissions					
Generated	Tons	278	270	239	-14.0%
Displaced/Avoided	Tons	-53	-40	-33	-38.3%
Net Total	Tons	224	230	206	-8.2%
Facility Energy Use					
Electricity	kWh	4,852,145	4,737,782	4,611,709	-5.0%
Natural Gas	Therms	53,774	104,146	106,880	98.8%
Total Facility Energy Use	kBTU	21,932,295	26,578,096	26,421,252	20.5%
Revenue and Non-Revenue Fleet Vehicle Energy Use					
Diesel	Gallons	2,377,099	2,444,632	2,223,337	-6.5%
Gasoline	Gallons	312,435	313,628	321,482	2.9%
CNG	GGE	0	1,062	4,039	-
Biodiesel	Gallons	0	2,572	6,391	-
Non-Revenue Fleet Energy Use	kBTU	3,586,612	2,881,818	4,541,876	26.6%
Total Vehicle Energy Use	kBTU	367,320,427	377,231,174	348,439,963	-5.1%
Revenue Fleet Operations[2]					
Vehicle Miles	Miles	12,084,554	11,949,953	11,662,722	-3.5%
Vehicle Revenue Miles	Miles	8,873,571	8,843,046	8,723,007	-1.7%
Ridership					
Service Population	People	737,100	737,100	777,905	1.3%
Passenger Miles Traveled	Miles	64,091,394	53,538,672	49,520,038	-22.7%
Boardings	Trips	13,440,131	12,449,750	11,716,602	-12.8%
Employee Commute					
Vehicle Miles Traveled	Miles	4,842,125	3,415,751	3,404,480	-29.7%
Waste and Recycling					
Generated	Tons	977	1,189	1,189	21.8%
Diverted	Percent or Percentage Points	31%	52%	52%	21 p.p.[3]
Water					
Consumed	Gallons	5,564,372	6,008,690	6,895,812	23.9%

Notes: Totals may not sum due to rounding.
[1]Net GHG emissions equal SamTrans' generated emissions minus emissions displaced by SamTrans
[2]Vehicle Miles, Vehicle Revenue Miles, Passenger Miles Traveled and Boardings exclude taxi/purchased demand services, which are not under SamTrans' operational control
[3]p.p. = percentage points

INTRODUCTION

About the San Mateo County Transit District

About this Report

SamTrans Ridership and Operations

About the San Mateo County Transit District

The San Mateo County Transit District ("the District") provides public transportation services within and outside of San Mateo County, California, a 455 square-mile area with a population of approximately 777,905. The District leads the planning, development and management of a multi-modal public transportation system that includes buses, trains, shuttles and paratransit services. The District is the managing agency operating three business units:

SamTrans

SamTrans delivers fixed-route bus, including express service, paratransit and shuttle services within San Mateo County. SamTrans currently operates 304 fixed-route revenue buses, 67 paratransit vehicles and administers a shuttle program. SamTrans has contracted with First Transit and MV Transportation to provide paratransit and some fixed-route services. SamTrans also sponsors shuttle service to and from Caltrain and BART stations.

Caltrain

Caltrain is a 77-mile-long heavy rail commuter rail service along the San Francisco Peninsula, serving thirty-two stations in three counties from San Francisco to Gilroy. Caltrain operates approximately 90 weekday trains, which include express, limited and local trains. In conjunction with employer and community partners, the Caltrain operates a shuttle service that serves as a vital link between the rail system, and work and community locations. Caltrain is owned and operated by the Peninsula Corridor Joint Powers Board (JPB), which is comprised of three member agencies: the District, the City and County of San Francisco, and the Santa Clara Valley Transportation Authority (VTA).

San Mateo County Transportation Authority

The San Mateo County Transportation Authority (TA) administers the countywide sales tax dedicated to transportation-related projects and programs in the County. San Mateo County has passed Measure A in 2004, a half-cent sales tax to support transportation and infrastructure investment. The TA is also responsible for administering 50% of Measure W, a half-cent sales tax measure approved by voters of San Mateo County in 2018. The other 50% is administered by the SamTrans.

The District partners with other agencies in delivering its services, such as City/County Association of Governments of San Mateo County (CCAG), the Bay Area Rapid Transit (BART), Valley Transportation Authority (VTA), San Francisco Municipal Transportation Agency (SFMTA or Muni), Metropolitan Transportation Commission (MTC), as well as Santa Clara, San Mateo and San Francisco Counties to promote regional and efficient regional transit.

About this Report

The District's sustainability program supports the District's ambitious efforts to improve the sustainability of its own operations by encouraging operational and policy changes that reduce resources, carbon emissions and improve sustainable practices among staff.

Sustainability is a key component of the District's vision to become a mobility leader that provides safe transportation choices that support a sustainable future. The District's Sustainability Policy, below, outlines six key commitments that support the operations of the agency.

Over 60% of San Mateo County's greenhouse gas emissions and over 40% of California's greenhouse gas emissions stem from surface transportation (all modes). Whether Californians choose to drive or take public transit is one of the most important sustainability choices they make every day. The sustainability program supports the District's goal of helping residents shift their mode of transportation to reduce on road greenhouse gas emissions and improve air quality.

The District is a founding signatory of the American Public Transportation Association's (APTA's) Sustainability Commitment. The Commitment provides a framework for transit agencies to manage sustainability within their agency, and includes a set of key performance metrics for tracking sustainability performance. In 2011, the District received the bronze APTA Sustainability Commitment Recognition for SamTrans operations, and in April 2018, APTA recognized both SamTrans and Caltrain with silver-level status for the agencies' continued achievements in sustainability.

San Mateo County
TRANSIT DISTRICT

The District's Sustainability Policy commits the District to:

- **Streamline business practices** to reduce waste and improve operational effectiveness;
- **Evaluate and improve** the long-term resource efficiency of facilities and equipment, including the life-cycle return on investment;
- **Educate and incentivize** employees to integrate sustainability practices into their work and their personal lives;
- **Encourage business partners** to incorporate sustainability practices into their own operations;
- **Measure the environmental impacts** of activities on an ongoing basis, and set and meet targets to reduce our impacts; and
- **Deploy sustainability**-themed programs that encourage the use of public transit and that support our local communities.

Report Purpose and Scope

This is the second sustainability report prepared for SamTrans, the first of which was prepared in 2017. The baseline year for both reports is FY2010, a standard that SamTrans adopted in 2017 in order to report under the APTA Sustainability Commitment. Baseline year data is shown in Table 3 as a shaded column for comparison.

This report was prepared to share data on SamTrans' FY2017 and FY2018 sustainability performance. This report includes information on key sustainability performance metrics and summarizes sustainability achievements as well as current and planned initiatives. This sustainability inventory and report focuses specifically on the facilities, fixed-route bus, paratransit and shuttle services under the operational control of SamTrans. This report also includes information on non-revenue vehicles and employee commuting across all three District units due to overlapping roles. The District has prepared a separate sustainability inventory and report for Caltrain operations that does not include either non-revenue vehicles or employee commuting to avoid double-counting.

The greenhouse gases reported include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) and are presented in this report as metric tons of carbon dioxide equivalent ($MTCO_2e$).

This report addresses the following sustainability indicators:

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

GHG emissions are reported by scope. Scope 1 includes all emissions directly emitted by SamTrans, Scope 2 includes all indirect emissions from purchased electricity or steam and Scope 3 includes all other indirect emissions.

Sustainability indicators are normalized by SamTrans annual vehicle miles (VM) including fixed-route bus, paratransit and shuttle services. VM represent the miles traveled from the time a vehicle pulls out from its garage to go into revenue service to the time it pulls in from revenue service, including "deadhead" miles without passengers to the starting points of routes or returning to the garage. Normalizing by VM enables SamTrans to evaluate improvements in vehicle and facility efficiency.

SamTrans Ridership and Operations

SamTrans is at a unique point of transformation in the agency's history and is positioning itself to serve a new generation of transit riders. With the passage of Measure W, SamTrans was able to launch *Reimagine SamTrans*, a Comprehensive Operational Analysis (or COA) to study transit agency services.

The study will enable the agency to focus on three priorities:

- Improve the experience for current transit riders
- Reach new riders and increase the frequency of ridership
- Increase the agency's efficiency and efficacy as a mobility provider.

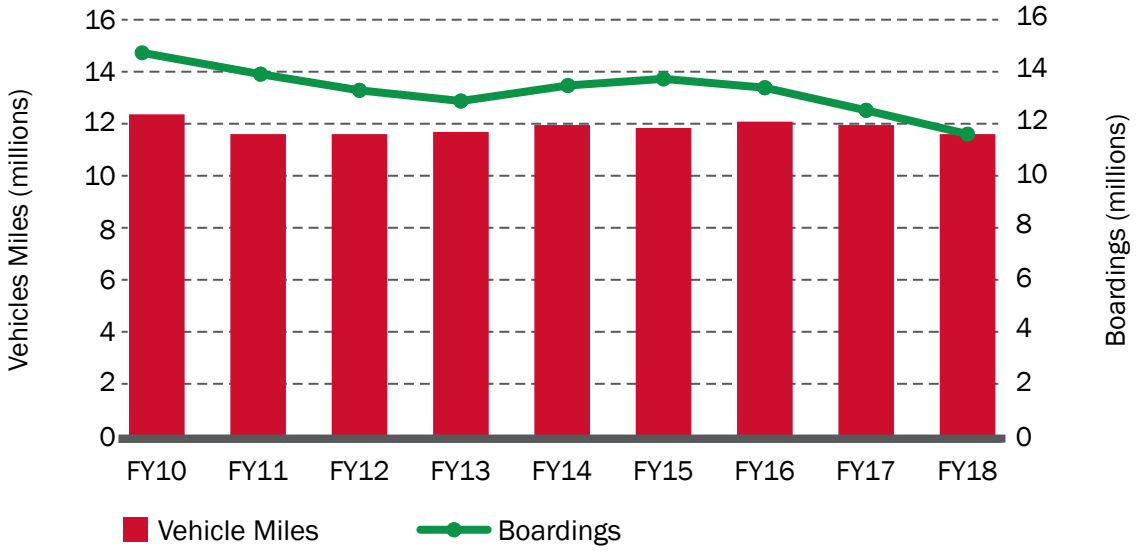
Key Stats - FY2018

Operates
71 Fixed Routes

Serves more than
46,000 passenger boardings
each weekday

Provides nearly
9 million miles
of passenger bus service per year

Figure 1: SamTrans Service Summary



Note: Excludes taxi/purchased demand services

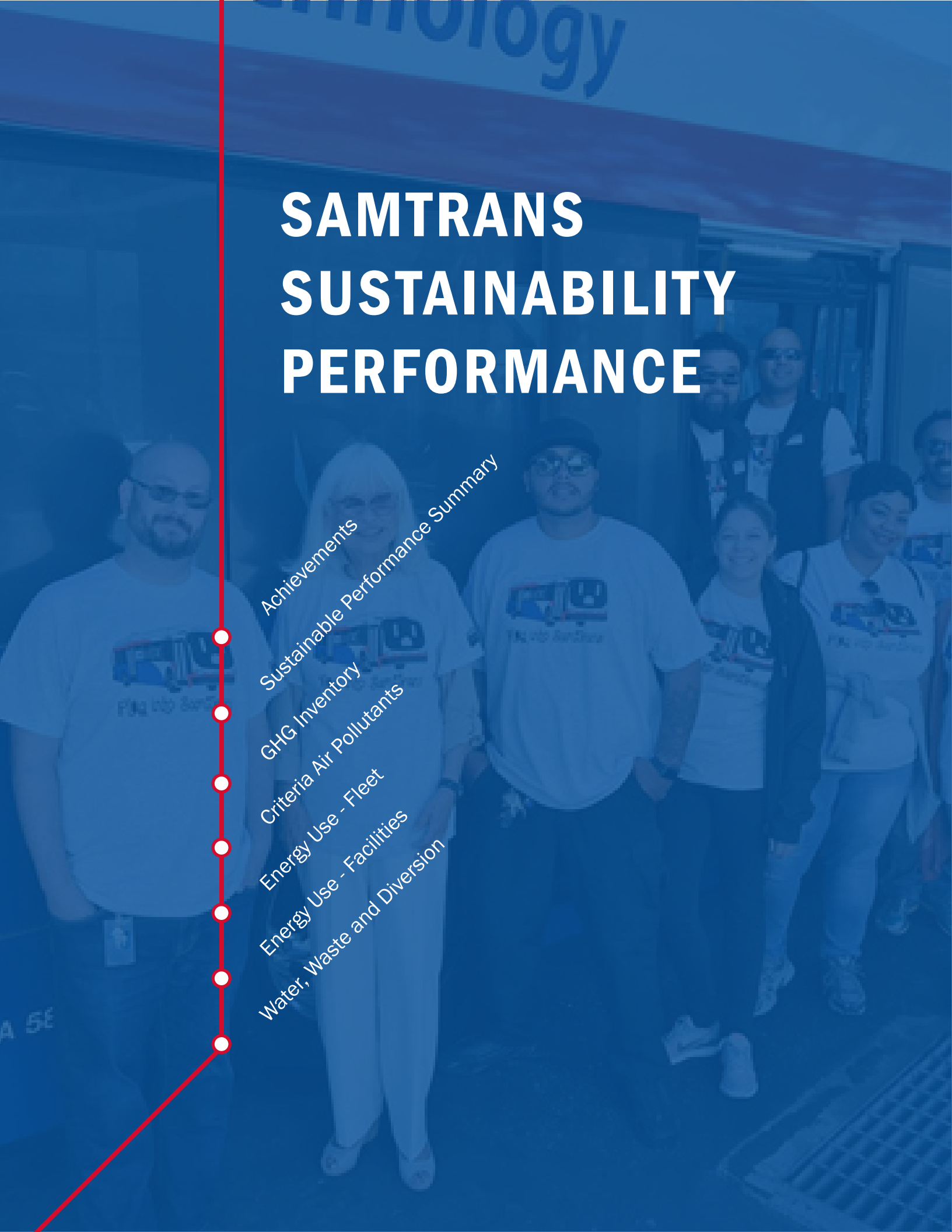
SamTrans serves over 46,000 riders each day in San Mateo County through its bus, paratransit and shuttle services. SamTrans offers a diverse and evolving set of mobility options, including 71 fixed-route bus service lines, Redi-Wheels and Redi-Coast paratransit service.

However, consistent with most U.S. transit agencies, SamTrans has faced declining ridership. Vehicle miles remained relatively stable, declining only 5% between FY2010 and FY2018, while ridership declined 20% in the same period.

Factors contributing to ridership decline include inexpensive gasoline, competition from companies like Lyft and Uber, a robust economy and a shifting commuter demographic. In the Bay Area for example, the high cost of living makes it difficult for workers to live and work in the same county, encouraging "super commutes" that are challenging to serve with transit.

The *Reimagine SamTrans* study will review SamTrans' service, the strengths and challenges in the current bus system and utilize data and public input to identify ways to improve. Combining data, innovative thinking and input from the community, *Reimagine SamTrans* aims to develop the best bus transportation system possible to serve San Mateo County into the future.

The San Mateo County Congestion Relief Plan, which is funded by Measure W, is a sales tax measure approved by the voters in 2018. Measure W will invest in a variety of projects to reduce congestion and attract riders.



SAMTRANS SUSTAINABILITY PERFORMANCE

Achievements

Sustainable Performance Summary

GHG Inventory

Criteria Air Pollutants

Energy Use - Fleet

Energy Use - Facilities

Water, Waste and Diversion

SamTrans Achievements

-18%

GHG emissions generated decreased by 18% compared to FY2010.

In FY2018, SamTrans generated 6,040 fewer metric tons of GHGs compared to FY2010.

-12%

Revenue and non-revenue vehicle fuel consumption decreased by 12%.

Total revenue and non-revenue vehicle fuel consumption decreased by 48.6 million kBTU between FY2010 and FY2018. Although vehicle miles decreased by approximately 5% during this time period, revenue vehicle fuel consumption decreased by more than twice that amount as a result of using more efficient vehicles.

-16%

Facility electricity use decreased by 16% compared to FY2010.

Total electricity consumption decreased by over 850,000 kilowatt hours between FY2010 and FY2018–the equivalent of powering 121 homes in California for a year.

Sustainability Programs

Zero Emission Buses

In addition to using resources more efficiently, SamTrans is transforming its diesel bus fleet to a zero emission fleet. In 2018, the SamTrans Board of Directors voted to replace 10 diesel buses with battery electric buses in a pilot program. These buses not only eliminate carbon emissions associated with diesel; they will also reduce or eliminate emissions of other air pollutants such as sulfur dioxide, nitrous oxide, ozone, and particulate matter – all of which contribute to illnesses such as asthma and cardiovascular disease. A single electric bus saves SamTrans approximately 10,000 gallons of diesel fuel annually, and once the fleet is converted, SamTrans' primary source of carbon emissions, its diesel use, will be dramatically reduced. SamTrans is preparing a plan that will chart the path for its transition to a zero emission fleet consistent with the California Air Resources Board's Innovative Clean Transit Program.

Climate Adaptation and Resilience

San Mateo County, as with many other coastal communities, is vulnerable to the impacts of climate change. To better understand the impacts of sea level rise on transportation infrastructure, SamTrans participated in the San Mateo County Sea Level Rise Vulnerability Assessment in 2017. Based on this assessment, which revealed vulnerabilities at SamTrans operations and maintenance facilities, the District applied for and was awarded a Caltrans Adaptation Planning Grant through the Caltrans Integrated Climate Adaptation and Resilience Program. The District is currently working on an Adaptation and Resilience Plan to evaluate and address the impacts of sea level rise and high heat days on the SamTrans system. When complete, the Plan will include a vulnerability assessment of SamTrans facilities, equipment and passengers and recommend adaptation strategies to improve the resilience of the whole system.

SamTrans Sustainable Performance Summary

Table 2 summarizes SamTrans' FY2018 performance across eight sustainability indicators per vehicle mile compared to FY2010. The percentage indicates the change in total resource consumption while the text below indicates the change per vehicle mile.

Table 2: Sustainability Indicator Summary for FY2018 Compared to FY2010

Indicator	← Less Sustainable Percent Change between FY2010 and FY2018	More Sustainable → Percent Change between FY2010 and FY2018
GHG Emissions Generated[1]		18% 0.8 fewer pounds per vehicle mile
Net GHG Emissions[1]		4% 0.1 additional pounds per vehicle mile
Energy Use in Facilities		11% No change in kBTU per vehicle mile
Energy Use in Revenue and Non-Revenue Fleet		12% 2.3 fewer kBTU per vehicle mile
Criteria Air Pollutants Generated		21% No change in pounds per vehicle mile
Water Consumed		24% 0.1 fewer gallons per vehicle mile
Waste Generated[2]	33% 0.1 additional pounds per vehicle mile	
Waste Diverted[3] (recycled/composted)		37 p.p.

[1] Excludes employee commuting
[2] Waste data was not available until FY2014. Therefore, waste performance is compared to FY2014.
[3] Diversion is measured as the percent of total waste generated that was diverted from landfill through recycling or composting. The diversion rate is not normalized by boarding.

Table 3 provides information on SamTrans' sustainability performance over the past nine years and the baseline year (FY2010).

Table 3: SamTrans Sustainability Indictor Areas[1]

Indicator	Unit	Baseline: 2010	2011	2012	2013	2014
Greenhouse Gas Emissions						
Generated	$MTCO_2e$	34,271	32,045	35,311	31,349	31,210
Displaced/Avoided	$MTCO_2e$	-11,982	-10,648	-10,648	-9,881	-9,766
Net Total	$MTCO_2e$	22,289	24,663	24,663	21,468	21,444
Criteria Air Pollutant Emissions[2]						
Generated	Tons	388	345	379	313	300
Displaced/Avoided	Tons	-128	-103	-94	-78	-69
Net Total	Tons	260	242	286	235	231
Facility Energy Use						
Electricity	kWh	5,466,402	4,999,144	4,937,101	4,959,179	5,085,783
Natural Gas	Therms	108,719	110,598	108,695	110,442	96,605
Total Facility Energy Use	kBTU	29,521,443	28,114,946	27,712,992	27,962,983	27,011,604
Revenue and Non-Revenue Fleet Vehicle Energy Use						
Diesel	Gallons	2,753,510	2,546,084	2,836,600	2,439,629	2,380,852
Gasoline	Gallons	134,314	128,482	175,950	188,234	257,258
CNG	GGE	0	0	0	12,113	16,172
Biodiesel	Gallons	0	0	16,640	45,621	45,411
Non-Revenue Fleet Energy Use	kBTU	4,344,481	3,963,102	4,068,261	3,643,543	3,735,282
Total Vehicle Energy Use	kBTU	397,035,828	367,662,257	415,846,138	367,485,279	368,375,279
Waste and Recycling[3]						
Generated	Tons	NA[2]	NA[2]	NA[2]	NA[2]	894
Diverted	Percent or Percentage Points	NA[2]	NA[2]	NA[2]	NA[2]	15%
Water						
Consumed	Gallons	9,062,020	9,064,264	9,092,688	10,248,348	10,376,256

Notes: Totals may not sum due to rounding. $MTCO_2e$ = metric tons of carbon dioxide equivalent; FY = fiscal year; kWh = kilowatt hours; kBTU = thousand British thermal units; CNG = compressed natural gas; GGE = gasoline gallon equivalent.

1 This sustainability inventory and report focuses specifically on the facilities, fixed-route bus, paratransit, and shuttle services under the operational control of SamTrans. This inventory also includes indicators for non-revenue vehicles and employee commuting across all three District units due to overlapping roles. The District has prepared a separate sustainability inventory and report for Caltrain operations that does not include either non-revenue vehicles or employee commuting to avoid double-counting.

2 Includes ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$.

3 Waste and diversion data was not available until FY2014. For the purposes of this inventory, it was assumed that waste and diversion for FY2010 through FY2013 was the same as FY2014.

Table 3: SamTrans Sustainability Indicator Areas, Continued

Indicator	Unit	2015	2016	2017	2018	FY10 to FY18 Change
Greenhouse Gas Emissions						
Generated	$MTCO_2e$	30,404	31,015	30,904	28,231	-18%
Displaced/Avoided	$MTCO_2e$	-9,530	-9,328	-7,593	-6,854	-43%
Net Total	$MTCO_2e$	20,875	21,687	23,310	21,377	-4%
Criteria Air Pollutant Emissions[2]						
Generated	Tons	281	278	270	239	-39%
Displaced/Avoided	Tons	-60	-53	-40	-33	-74%
Net Total	Tons	221	224	230	206	-21%
Facility Energy Use						
Electricity	kWh	4,944,275	4,852,145	4,737,782	4,611,709	-16%
Natural Gas	Therms	68,336	53,774	104,146	106,880	-2%
Total Facility Energy Use	kBTU	23,702,536	21,932,295	26,578,096	26,421,252	-11%
Revenue and Non-Revenue Fleet Vehicle Energy Use						
Diesel	Gallons	2,450,796	2,377,099	2,444,632	2,223,337	-19%
Gasoline	Gallons	115,038	312,435	313,628	321,482	139%
CNG	GGE	16,172	0	1,062	4,039	-
Biodiesel	Gallons	6,918	0	2,572	6,391	-
Non-Revenue Fleet Energy Use	kBTU	3,584,715	3,586,612	2,881,818	4,541,876	5%
Total Vehicle Energy Use	kBTU	355,325,984	367,320,427	377,231,174	348,439,963	-12%
Waste and Recycling[3]						
Generated	Tons	977	977	1,189	1,189	33%
Diverted	Percent or Percentage Points	31%	31%	52%	52%	37 p.p.
Water						
Consumed	Gallons	9,623,020	5,564,372	6,008,690	6,895,812	-24%

Notes: Totals may not sum due to rounding. $MTCO_2e$ = metric tons of carbon dioxide equivalent; FY = fiscal year; kWh = kilowatt hours; kBTU = thousand British thermal units; CNG = compressed natural gas; GGE = gasoline gallon equivalent.

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3 Waste and diversion data was not available until FY2014. For the purposes of this inventory, it was assumed that waste and diversion for FY2010 through FY2013 was the same as FY2014.

SamTrans GHG Inventory

Greenhouse gas emissions (GHGs) are primarily generated by burning fossil fuels. In the United States, transportation represents approximately 29% of all GHG emissions. In this inventory, emissions of carbon dioxide, methane and nitrous oxide are calculated into a carbon dioxide equivalent (CO_2e) according to their global warming potentials, which measures the pollutant's insulating effect (e.g., ability to warm the earth's atmosphere or greenhouse effect). Other GHGs, such as sulfur hexafluoride and refrigerants, are excluded from this inventory at this time, though they may be added in future inventories.

SamTrans generated approximately 30,904 metric tons of Scope 1, 2 and 3 CO_2e ($MTCO_2e$) in 2017 and 28,231 $MTCO_2e$ in 2018. To compare that figure to overall Bay Area transportation emissions, the Metropolitan Transportation Commission (MTC) estimates that approximately 23 million $MTCO_2e$ were emitted by gasoline and diesel cars, trucks, motorhomes and motorcycles in the nine-county San Francisco Bay Area in 2014.

Assuming that SamTrans passengers would have otherwise driven for their trip, we can estimate the amount of emissions that SamTrans' displaces. Figure 2 shows a line graph of SamTrans's net GHG emissions, with generated and displaced emissions highlighted as bars for each fiscal year. In this chart, displaced emissions are equal to the emissions avoided from passengers riding SamTrans instead of driving their personal cars. Generated emissions decreased by approximately 18% since FY2010. However, displaced emissions decreased during this time, resulting in smaller decrease in net GHG emissions (approximately 4%).

Between FY2010 and FY2018

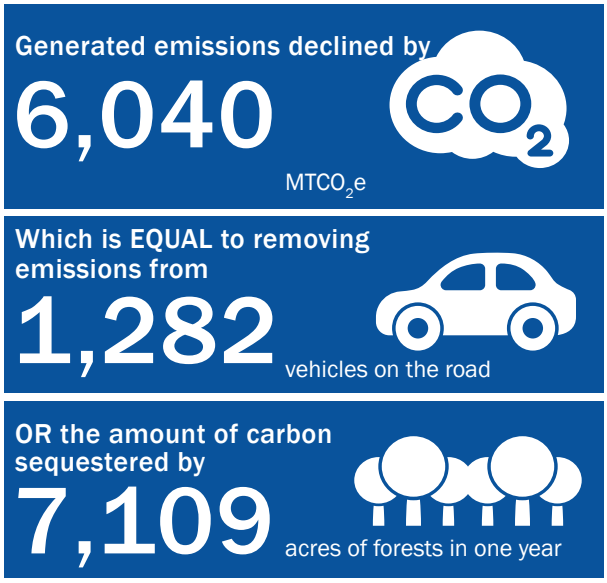


Figure 3 shows the percentage breakdown of sources contributing to GHG emissions generated by SamTrans operations in FY2018. Figure 3 highlights only GHG emissions generated by SamTrans (excluding displaced trips) and reveals an overall slight decreasing trend. This graph, and the one following it, reveals that the overwhelming majority of emissions are generated by diesel use in buses, which contributed approximately 80% of generated GHG emissions in 2018. SamTrans projects a continuing ongoing reduction in the emissions created by diesel combustion as a result of the transition to both cleaner diesel vehicles as well as battery-electric technology.

Figure 2: GHG Emissions – Generated, Displaced and Net

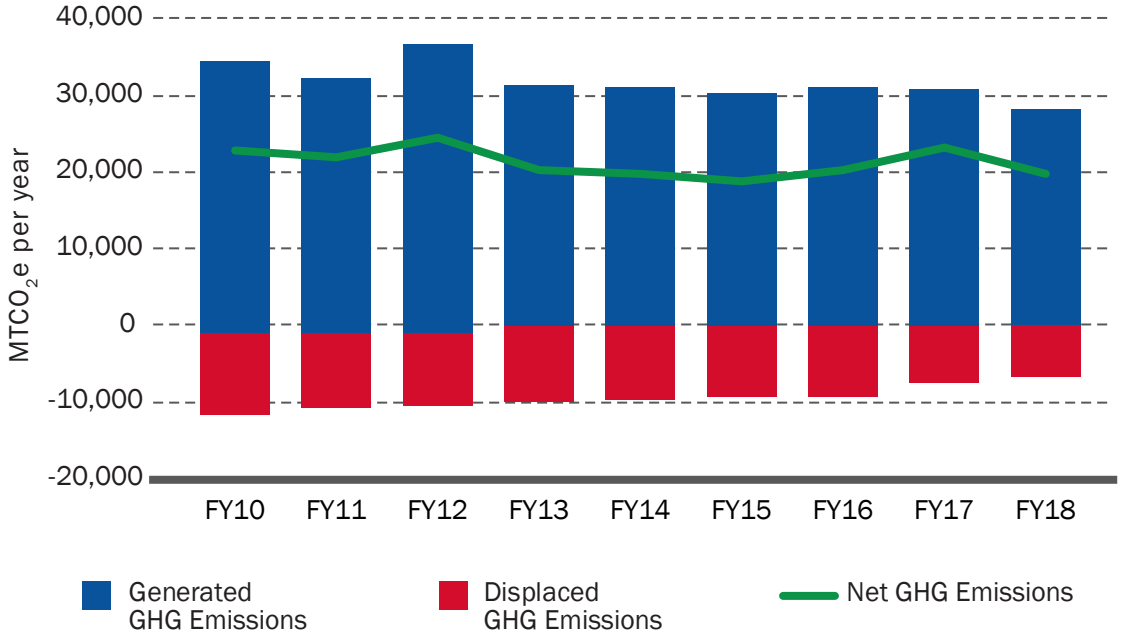
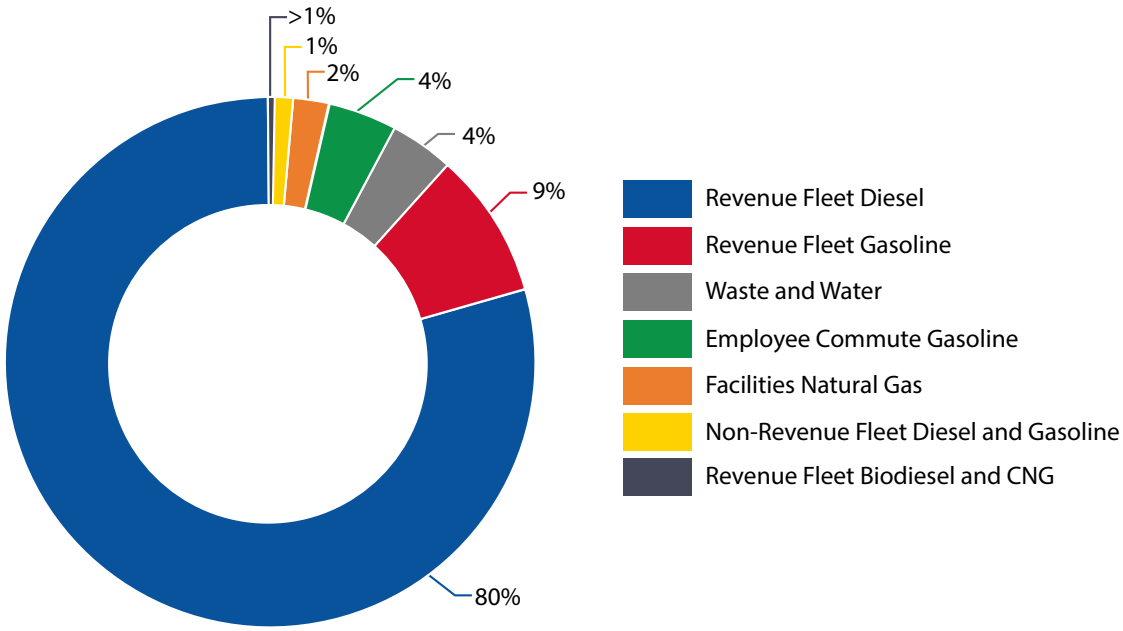


Figure 3: GHG Emissions by Source (FY2018 values)



Note: Employee commuting emissions exclude contractors.

SamTrans Criteria Air Pollutants

Criteria air pollutants (CAPs) include pollutants that cause smog, acid rain and have been linked to negative health effects. CAPs are emitted from SamTrans vehicles that burn fossil fuels. However, SamTrans also displaces CAPs that otherwise would have been emitted if passengers had chosen to drive alone instead of taking public transit. Nitrogen oxides (NOx) represent approximately 70% of CAPs generated by SamTrans.

In Figure 4, the net reduction in CAPs is shown in a line graph, where the generated and displaced CAPs are shown in bars above and below the line. Displaced CAPs are equal to the CAPs that would have been generated if SamTrans passengers had instead chosen to drive, rather than take public transit.

Figure 5 shows the percent breakdown of sources contributing to the CAPs generated by SamTrans. Over 94% of CAPs from agency operations are the result of diesel fuel use in buses. As SamTrans continues to incorporate clean-diesel articulated buses and transition to zero-emission buses, the agency's CAP emissions will continue to decrease. In February 2018, SamTrans purchased 55 heavy-duty clean-diesel New Flyer buses to replace the same number of aging diesel-powered model articulated buses. The new vehicles produce 87% fewer nitrogen oxides and improve fuel efficiency by approximately 10%. All future bus procurements will be zero-emission vehicles that will emit zero tailpipe CAPs.

Figure 4: Criteria Air Pollutants - Generated, Displaced and Net

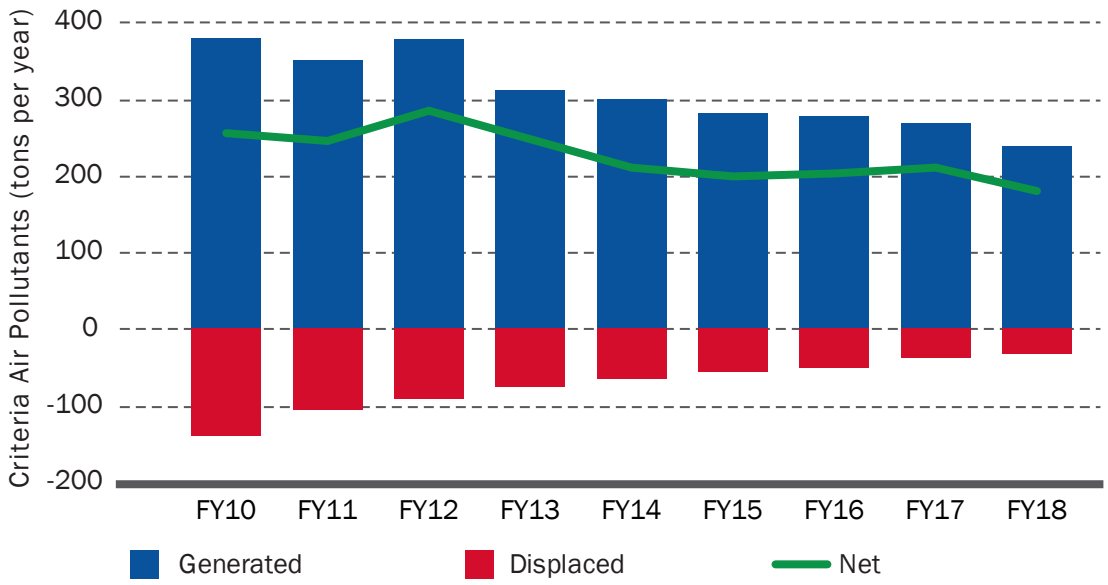
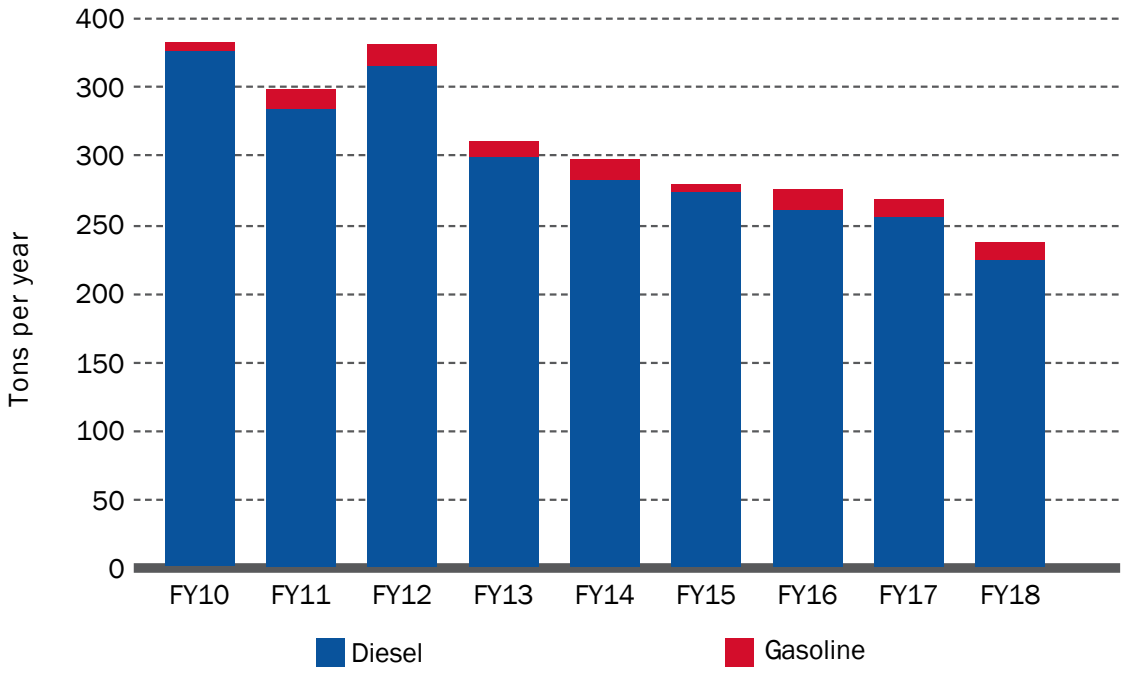


Figure 5: Criteria Air Pollutant Emissions by Source Type



Note: CAP emissions from Biodiesel and CNG are too small to be seen in this cart.

Employee Commuting

Emissions associated with employee commuting were calculated as part of SamTrans' Scope 3 GHG emissions. As shown in Figure 3 on page 18, employee commuting contributes approximately 4% of total SamTrans GHG emissions.

Annual employee vehicle miles traveled was estimated based on anonymized employee zip code information, workplace location and the conservative assumption that all employees are full time and commute five days per week to work via passenger vehicle due to lack of more specific data. The estimate is not adjusted to account for employees who telecommute all or part of the week. Vehicle miles traveled from third-party contractors are not included. Emissions associated with commuting via car were calculated based on Bay Area carpooling trends from the American Community Survey (ACS) and vehicle emissions from the California Air Resources Board Emission Factor Database (EMFAC 2014).

According to the ACS, the percent of Bay Area residence who drive alone decreased between 2015 and 2017. The reduced rate of driving alone, combined with lower average employee vehicle miles traveled and more fuel-efficient vehicles, has resulted in a 40% reduction in employee commuting emissions since FY2010. The actual percentage of employees driving personal vehicles may be lower, due to the agency's transit-oriented workforce and headquarters located in close proximity to transit stations.

SamTrans Energy Use- Fleet

SamTrans' fleet consists of revenue vehicles and non-revenue vehicles, including contractor operations under SamTrans' operational control. SamTrans' revenue vehicle fleet operates on diesel, gasoline, biodiesel, and compressed natural gas (CNG). The directly operated bus routes (SamTrans fixed-route) only use diesel fuel. The contracted fixed-route buses and shuttles use diesel, gasoline, biodiesel and CNG. Paratransit service, which includes Redi-Wheels and RediCoast, uses diesel and gasoline fuel. Demand taxi and purchased transportation services are excluded from this sustainability and GHG inventory because they are not under the operational control of SamTrans. SamTrans' non-revenue vehicle fleet includes gasoline-electric hybrid employee pool cars, supervisor cars, maintenance trucks and specialty vehicles (such as money-collection and ticket vending machine trucks) that use diesel and gasoline.

The revenue fleet makes up the majority of SamTrans' energy use, as measured in thousand British thermal units (kBTU). In FY2018, diesel and gasoline for buses made up 91% of all energy consumed by SamTrans.

Diesel fuel consumed by revenue fleet, primarily fixed-route bus service, makes up the majority of the fuel used by SamTrans. More than 2.4 million gallons of diesel were consumed in FY2017 and more than 2.2 million gallons were consumed in FY2018.

Figure 6 illustrates the amount of fuel used, in gallons, between FY2010 and FY2018. Diesel use decreased by 19% between FY2010 and FY2018. Gasoline use increased by nearly 190,000 gallons during this time period as the District converted most non-revenue vehicles to gasoline over the past three years. A small amount of CNG and biodiesel was consumed in FY2017 and FY2018 by contracted fixed-route vehicles.

SamTrans is taking progressive steps to transition its revenue fleet to zero-emission vehicles. The fleet currently includes 25 diesel-electric hybrid buses. In early 2018 SamTrans retrofitted 131 diesel buses with SensoTop software that increases mileage per gallon. SensoTop reduces fuel consumption by up to 7% through optimal gear shifting. SamTrans conservatively estimates the software will save approximately 18,750 gallons of diesel annually.

Figure 7 illustrates the fleet energy intensity over time. The graph shows that energy intensity per vehicle mile has slightly decreased over time while energy intensity per boarding has risen slightly since FY2010.

Figure 6: Fuel Use by Fuel Type

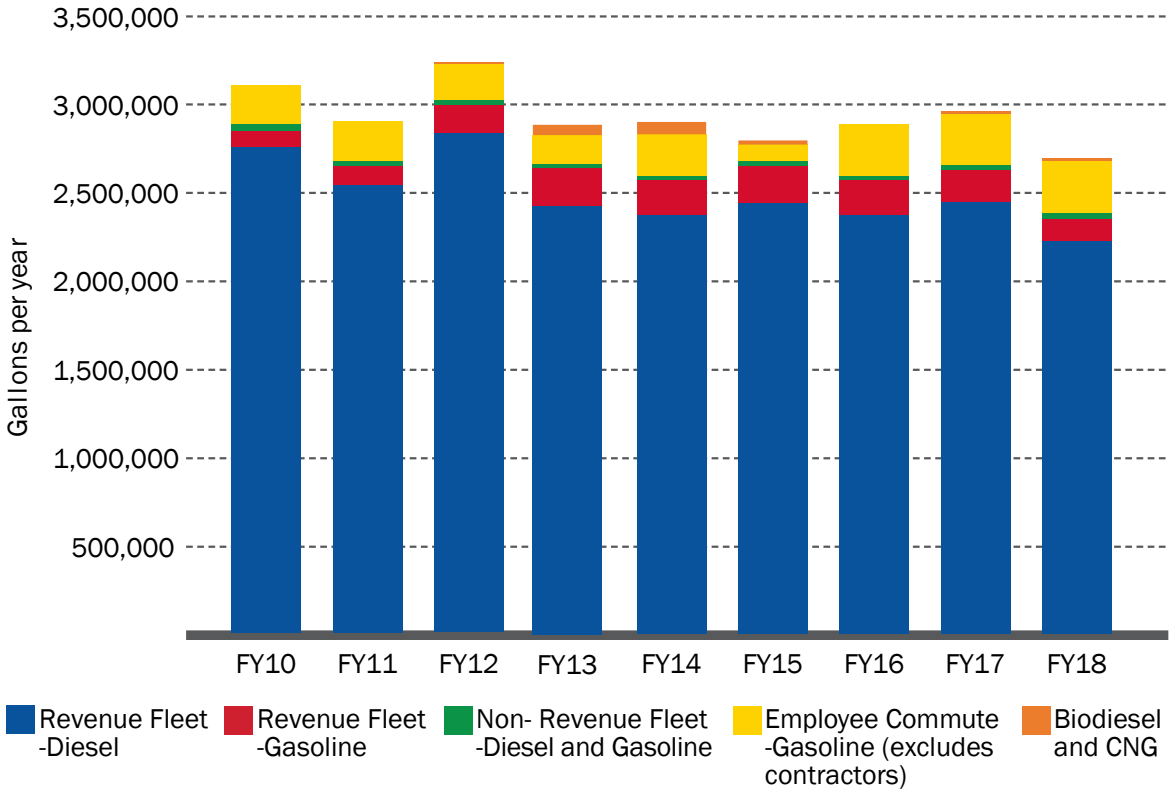
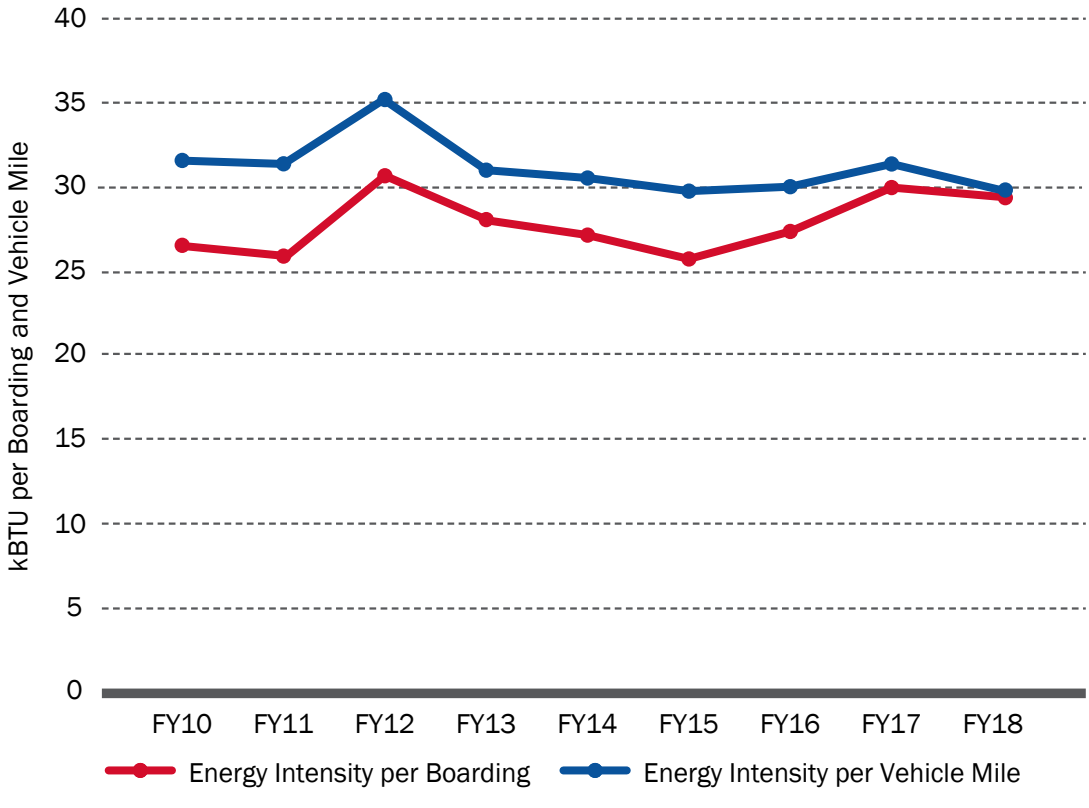


Figure 7: Revenue Fleet Energy Use per Boarding and Vehicle Mile



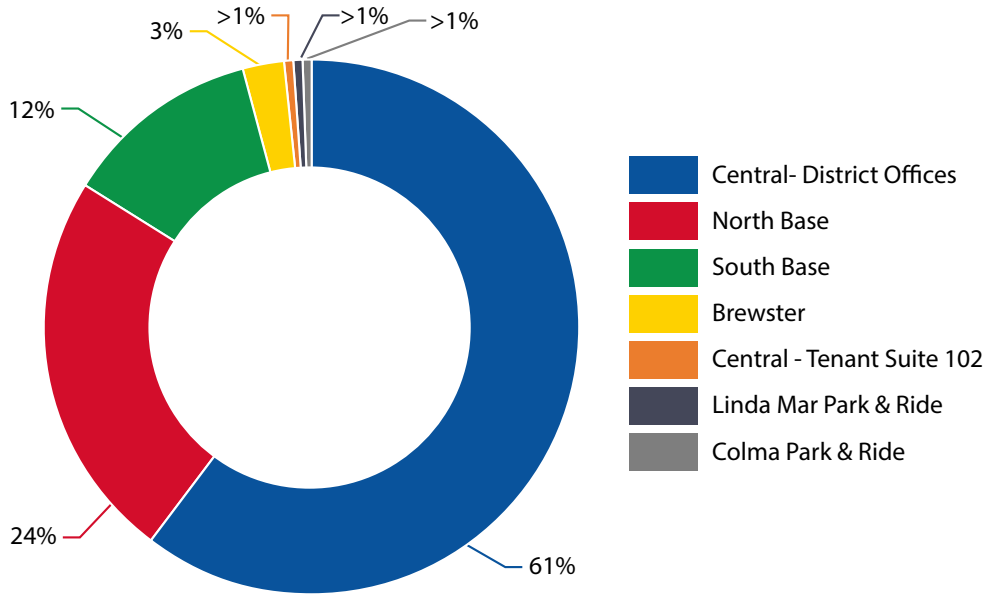
SamTrans Energy Use- Facilities

The District's four primary facilities include: Central Administrative Offices (Central), North Base Maintenance and Operations Facility (North Base), South Base Maintenance and Operations Facility (South Base) and Brewster Depot (Brewster is currently used by contracted bus and paratransit services). These facilities use electricity for lighting, office equipment, maintenance equipment and HVAC. Certain facilities also use natural gas for space heating. The District also operates the Linda Mar and Colma Park & Rides. SamTrans, Caltrain and the San Mateo County Transportation Authority all operate out of the Central Administrative Offices (Central). However, the energy use and emissions associated with Central are only included in SamTrans' inventory.

As of FY2018, SamTrans procures 100% certified renewable energy through San Mateo County's Community Choice Energy Program, Peninsula Clean Energy. This decision reduced SamTrans' carbon footprint from electricity use by 100%, equivalent to the annual carbon emissions of nearly 100 cars and more than 50 homes. GHG emissions from facility electricity use have decreased by approximately 1,284 $MTCO_2e$ from FY2010 to FY2018.

The bulk of SamTrans' facility energy use is at the Central offices, which in FY2018 consumed over 60% of all electricity (Figure 8). The Park and Ride locations consumed the least (less than 1%). As shown in Figure 9, total electricity and natural gas usage has decreased slightly since FY2010. Figure 10 presents facility energy intensity between FY2010 and FY2018.

Figure 8: Percentage of Energy Use by Facility (FY2018)



Note: Facilities owned by contractors are not included in this inventory.

Figure 9: Facility Energy Use

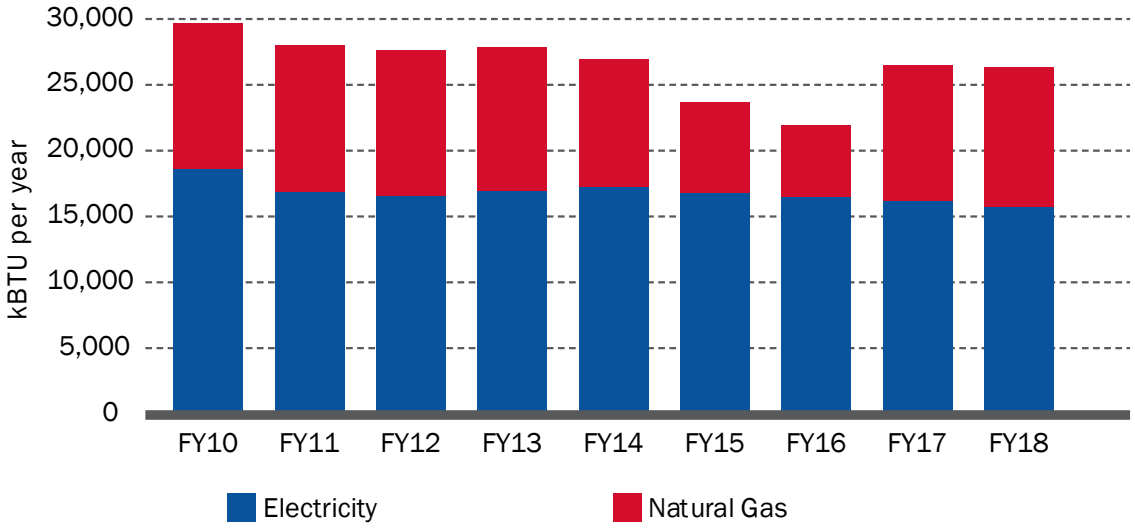
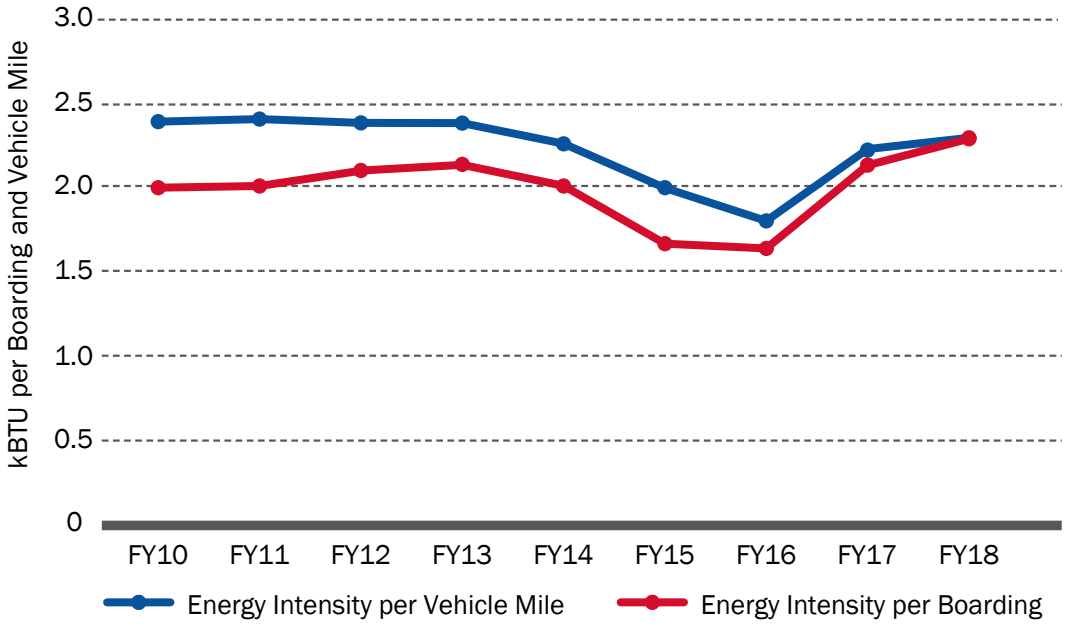


Figure 10: Facility Energy Use per Boarding and Vehicle Mile



SamTrans Water, Waste and Diversion

Water

SamTrans uses water for bus washing, limited outdoor irrigation and typical commercial water uses such as restrooms and showers. Emissions from water are generated indirectly through the combustion of fossil fuels in electricity generation for water delivery, conveyance and treatment. Though SamTrans does not directly control these emissions, they are included in this inventory because any emissions are a consequence of SamTrans' use of the water.

In response to California's historic drought, SamTrans implemented a number of water-saving conservation measures including: reducing the frequency of exterior bus washing by half; minimizing landscape irrigation; installing high-efficiency faucet aerators and showerheads in customer and staff restrooms; promptly fixing leaks; and providing water-saving tips through restroom and kitchen signage. As a result, SamTrans cut water usage in half in FY2016 compared to FY2014. Although California's historic drought was declared over in April 2017, SamTrans continued to implement water reduction practices through FY2018. As drought restrictions were lifted, SamTrans water consumption increased in FY2017 and FY2018, but remain far below FY2014 levels.

Figure 11 shows total water usage between FY2010 and FY2018. Overall, water use has declined substantially since FY2010, from over 9,000,000 gallons in FY2010 to less than 6,900,000 gallons in 2018. The average Californian uses 85 gallons of water per day. SamTrans' water reduction is approximately equivalent to the amount of water consumed annually by 70 people living in California.

Figure 12 identifies the percent breakdown of facilities consuming water in FY2018. The North Base facility consumed the largest percent of total water, followed by the Central and South Base facilities. The Sequoia facility, which is the SamTrans transit center in Redwood City, used only a small percentage of water, and water use was nearly eliminated at the park and ride locations.

Waste and Diversion

SamTrans-generated waste consists of municipal waste from passengers (paper, food scraps, bottles and cans, other common recyclables) and employees (from typical office activities and low-impact maintenance activities). Industrial maintenance waste (such as hazardous waste and large metal scrap recycling) and construction and demolition waste are not included in this inventory. Emissions from waste are generated as Scope 3 emissions and are included in this inventory.

The waste and diversion (recycling and composting) rates are estimated through invoices from SamTrans' waste service provider. For the purposes of this inventory, SamTrans assumes that all landfill, recycling and organics collection containers are 80% full when collected each week. This assumption may overstate the actual amount of discards generated and diverted. However, this is the best estimate available, as SamTrans' waste hauler does not report customer waste by actual weight, only volume of container capacity and scheduled pickup frequency.

Figure 13 shows total landfilled, recycled and composted waste as bars for each fiscal year. The total diversion rate, measured as the percentage of total waste diverted as recycling or compost, is shown as a blue line. SamTrans' total diversion rate increased to 52% in FY2017 once composting was added to North Base, South Base, and Brewster.

SamTrans' total water reduction is equivalent to the amount of water consumed

in a year by 70 Californians.

Figure 11: Water Consumption

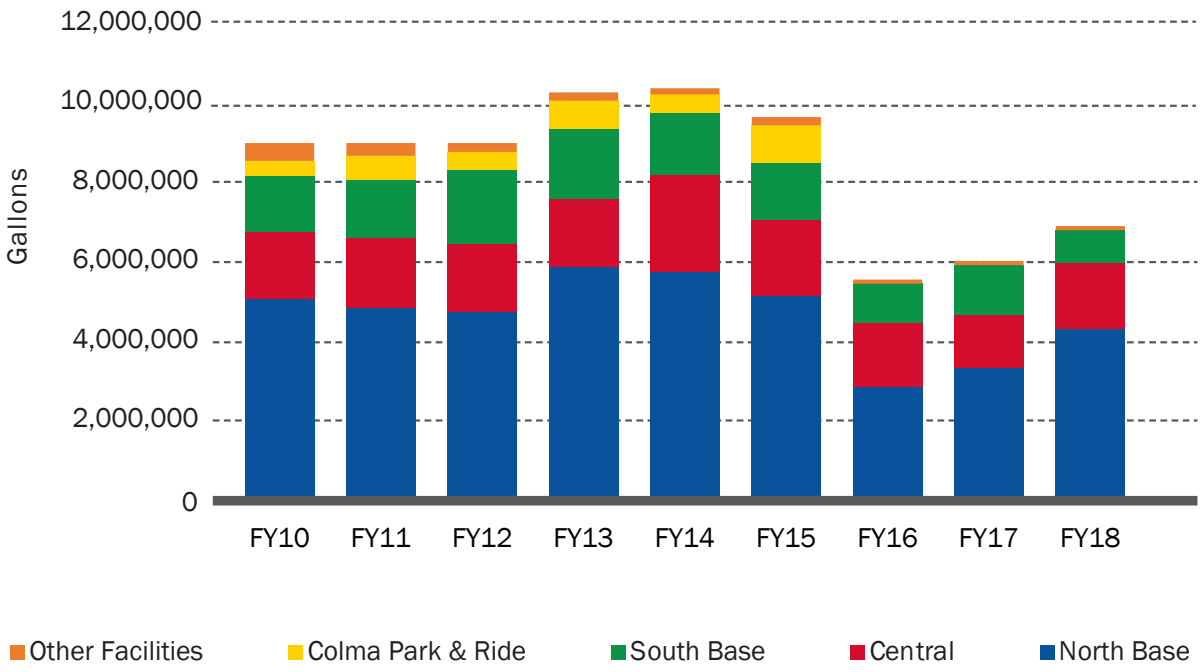
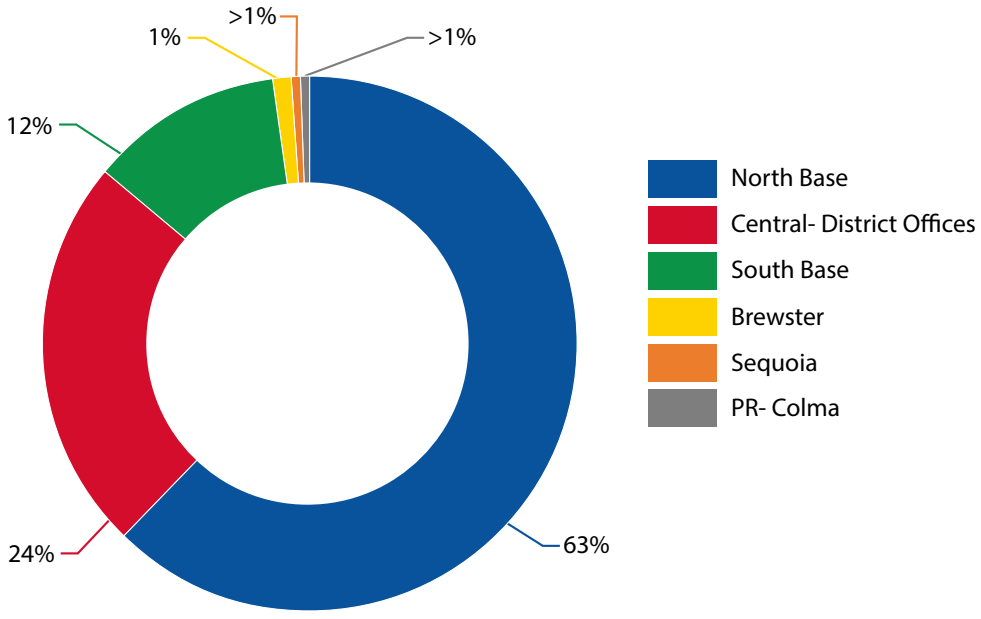


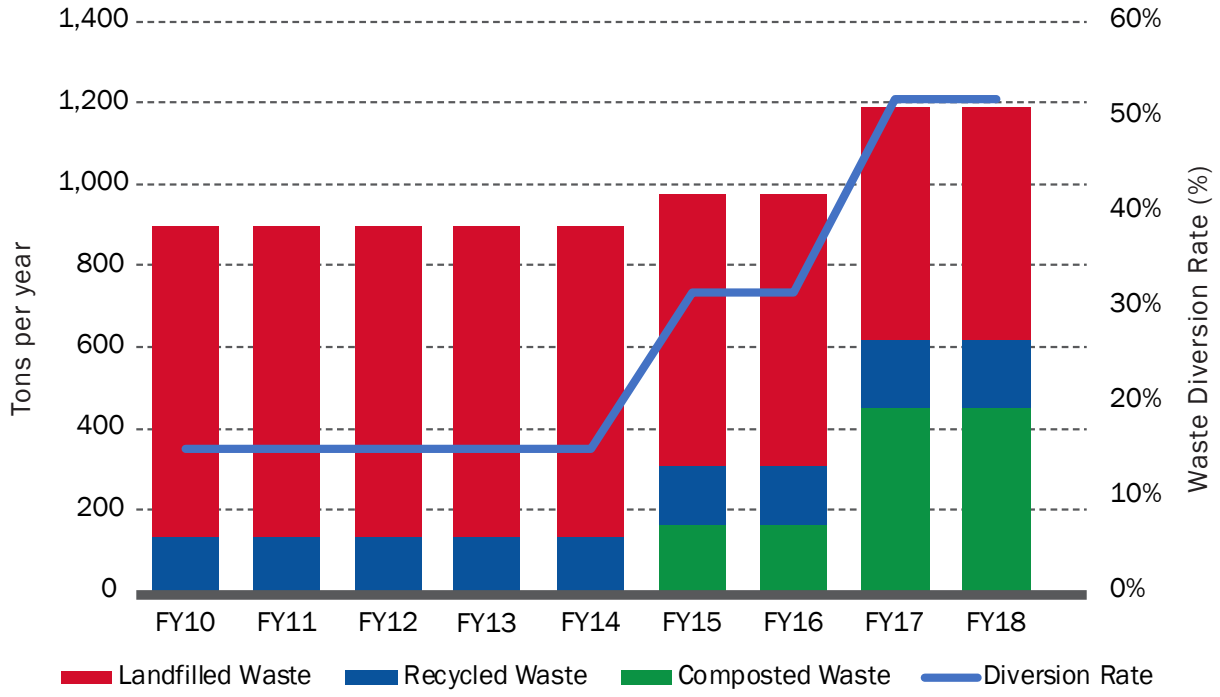
Figure 12: Percentage of Water Use by Facility (FY18)



Waste and Diversion

In FY2015, SamTrans introduced composting service at Central, and in FY2017 extended the program to North Base, South Base and Brewster. This program includes not only the service, but also upgraded waste bins and signage. Employees can also review the SamTrans Waste Sorting Training Manual to check what goes in the compost, recycle and landfill/trash bins. The initiative has helped SamTrans to double the District's diversion rate in the last two years.

Figure 13: Waste Disposal by Type



Note: Waste disposal from FY2010 through FY2014 is assumed to be the same as FY2014 due to insufficient data

CURRENT AND PLANNED INITIATIVES

SamTrans Current and Planned Initiatives

Electric Bus Pilot Program

SamTrans is in the process of transitioning to zero-emission buses in line with the California Air Resources Board (CARB) state-wide goal of transforming all transit fleets to zero-emission bus technology by 2040. Operating zero emission buses will require extensive renovation of SamTrans' facilities to accommodate new bus charging or fueling infrastructure. In 2018, SamTrans purchased 10 battery electric buses, which will help replace its oldest diesel vehicles and contribute to SamTrans' effort to reduce its fleet emissions.

Partnership with Miles App to Offer Rewards for Riding

SamTrans and Caltrain have partnered with Miles, an app that rewards users for all types of travel. Through the Miles mobile app, users can enjoy benefits similar to airline frequent flyer programs, but for all modes of transportation – including transit. In addition to the app's standard transit rewards, SamTrans and Caltrain riders will receive extra rewards such as gift cards, tickets, special offers and more. With creative, tech-forward pilots, SamTrans and Caltrain hope to encourage and reinforce the habit of transit ridership.

US-101 Express Bus Service

US-101 provides north-south vehicular connectivity in the San Francisco Bay Area and beyond, and is one of the most congested corridors in the Bay Area. In December of 2018, the SamTrans Board approved the US-101 Express Bus Feasibility Study, which outlines the agency's plan to use express buses to improve mobility options for long-haul freeway trips in San Mateo County and adjacent counties.

> Express bus service typically offers point-to-point service to key commuter destinations, making fewer stops and sometimes operating at higher frequencies than traditional bus services.

The six top performing routes identified in the study will be phased in over the next few years, mostly in conjunction with the planned US-101 San Mateo County Express Lanes Project. The first new service from the study, Route FCX, launched in August of 2019 and provides a connection between Foster City and Downtown San Francisco. The new route provides peak hour, bi-directional bus service to a new transit market that has been unserved since service cuts in 2011. At the time of service launch, 40-foot diesel buses were used. However, uptake on the route was so strong that, within two days, 60-foot articulated buses were needed at certain times in order to provide additional capacity. SamTrans has also been awarded $15 million in state funds to launch an express bus pilot program.

samTrans