

Climate Action Plan

Fiscal Year 2021

Introduction

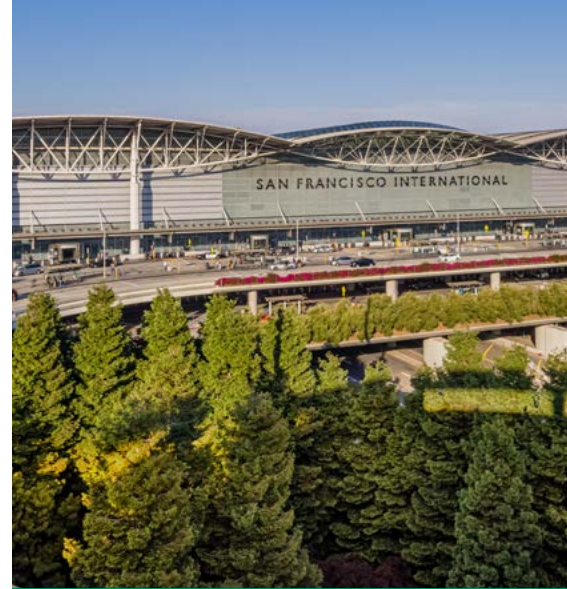
Key stakeholders across the airline industry, including the Federal Aviation Administration (FAA), Airlines for America (A4A), and Airports Council International (ACI), have set a goal of net zero carbon by 2050. This aligns with the United Nations Paris Agreement, a legally binding international treaty on climate change adopted in 2015, to limit global temperature rise well below 2 degrees Celsius when compared to pre-industrial levels. To make this goal a reality, access to carbon-free fuel, infrastructure, building systems, transportation services, and more will be needed. San Francisco International Airport's (SFO or the Airport) environmental and climate leadership supports and accelerates beyond our sector's 2050 goal, by targeting net zero carbon by 2030. SFO defines net zero carbon as the reduction of airport-controlled greenhouse gas (GHG) emissions to be less than or equal to emissions sequestered on-site.

Implementing initiatives to achieve both the SFO-specific and 2050 industry-wide targets are ambitious and challenging amid the COVID-19 economic and pandemic crises. Globally, flight traffic saw a 60% decrease from pre-pandemic levels. As an international gateway to the Bay Area, SFO flights decreased 30% in FY 2020 and 66% in FY 2021 from FY 2019 levels. However, this downturn was not a time for the aviation sector to be idle in addressing the parallel climate crisis. Airlines, airports, alternative fuel producers, and the associations representing each revisited pre-pandemic emissions targets and mapped a path to a recovery that wouldn't be business as usual but a return to service that reflected climate leadership.

As SFO confronted the economic and pandemic crises, it too had to face a third challenge - an unprecedented wildfire season - which further affirmed the need to focus on SFO's own emissions-free, net zero carbon future. To guide its pandemic response and recovery, and ultimately resilience from future hazard events, SFO created its [Interim Strategic Plan: COVID -19 Recovery to Resilience Framework](#). The framework's original goals, objectives, and indicators were updated based on the lessons learned during the response to the pandemic and now include SFO's commitment to combating climate change, achieving net zero carbon by 2030, and elevating racial equity— all of which serve as the foundation for this year's Climate Action Plan.

Sustainable SFO

SFO has acted, and continues to act, as a bold leader in sustainable and resilient aviation. By conducting and publishing annual GHG inventories in a Climate Action Plan, SFO strives for transparency and accountability in its climate-related activities. In FY 2021, the Airport achieved a 35% decrease in



Net Zero Carbon

SFO has a net zero carbon goal by 2030 that is defined as the reduction of Airport -controlled greenhouse gas emissions to be less than or equal to emissions sequestered on-site.

2030

emissions compared to its 1990 baseline. As outlined in the Airport's ZERO Annual Report, between 2020 and 2021, energy use decreased by 1%, the waste diversion rate increased by 9%, campus water use decreased by 2%, and two new Green Building Certifications were achieved. Specifically, the Airport's two new AirTrain stations, constructed at the Grand Hyatt Hotel and Long-Term Parking Garage, earned Gold certification through the Leadership in Energy and Environmental Design (LEED) program developed by the U.S. Green Building Council. In addition, SFO's fleet of heavy-duty vehicles now operate on 100% renewable diesel and landfill-derived compressed natural gas (CNG). In FY 2021, the Airport added 7 new light-duty electric vehicles (EVs) to reach 36% light-duty fleet electrification.

SFO also participates in the Airport Carbon Accreditation (ACA) program created by ACI. ACA sets standards and guidelines for calculating carbon dioxide (CO₂) emissions, provides verification through an independent auditing process, and recognizes airports' carbon management across four levels of certification. SFO was originally accredited at Level 3 ("Optimization") in July of 2016 and has maintained this certification since then.

SFO is in the process of becoming ACA Level 4 certified, which will make it one of the first airports in North America to do so. Level 4 "Transformation" certification entails that an airport, in addition to reducing its own emissions, also reduce those of its business partners to achieve absolute emissions reductions. This new certification level will support the Airport's ongoing efforts to achieve net zero carbon by 2030.

To reach Level 4 certification, several new categories have been included in the FY 2021 GHG inventory or will be included in future inventories. The addition of these new categories to the Airport's carbon footprint is intended to provide a comprehensive inventory of all emissions arising from the Airport (Scope 3), not just those within its operational control (Scopes 1 & 2). These new emissions categories are:

- **Full Flight Aircraft Travel:** Emissions from all aircraft using the airport (departures only), including commercial airlines, private aviation, helicopters and cargo
- **Runway De-icing:** Emissions from the use of de-icing substances for treatment of surfaces and aircraft
- **Construction Equipment:** Although data was unavailable for FY 2021, the Airport will include emissions from fuel used in third party non-road construction vehicles and generators in future inventories

Sustainable Achievements

CUMULATIVE PROGRESS (1990-2021)

35%

lower emissions



ANNUAL PROGRESS (2020 -2021)

1%

lower energy use



2%

lower water use



9%

higher terminal waste diversion



EMISSIONS OVERVIEW



Emissions Overview

Climate Action Plans have three distinct emission categories: Scope 1 (Airport-controlled), Scope 2 (electricity), and Scope 3 (Airport-influenced). In FY 2021, SFO produced 19,207 metric tons of carbon dioxide equivalent (MTCO₂e) from Airport-controlled operations, which is less than 1% of total emissions (Scopes 1, 2, and 3). SFO’s GHG reduction goal of net zero carbon by 2030, set within its Strategic Plan, is limited to the scopes it controls (1 and 2).

Drivers of Emissions

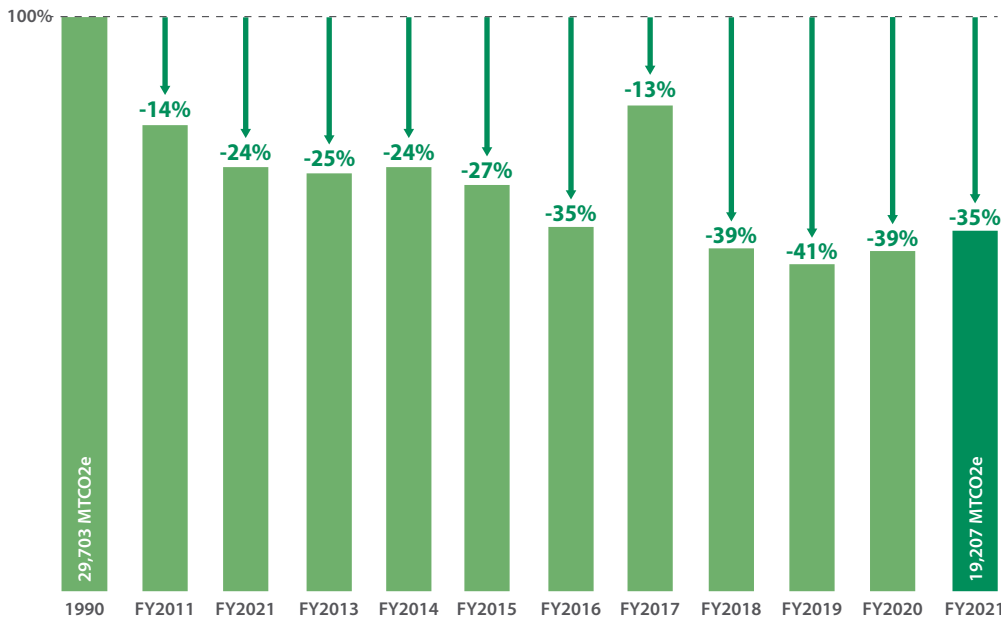
The primary drivers of emissions within the Airport’s control (Scopes 1 and 2) for FY 2021 were the burning of natural gas for terminal heating and fossil fuel use for fleet vehicles. The primary driver of emissions outside the Airport’s direct control (Scope 3) was from aircraft activity. In past years this has only included aircraft Landing and Takeoff (LTO) activity but for FY 2021 has been expanded to include full-flight activity for departing flights.

Although SFO is currently behind the target of reducing Airport-controlled emissions by 50% from 1990 levels, the full implementation of the Airport’s climate-related plans and policies will allow it to reach its target of net zero carbon in the future.

Emissions Trends at SFO

SFO has tracked emissions and published an annual Climate Action Plan since 2011. As shown in Figure 1, the Airport has been successful in reducing emissions within its control from 29,703 to 19,207 MTCO₂e since 1990. This 35% absolute reduction is equivalent to 10,495 MTCO₂e or the energy used in 1,300 homes in a year. Because the Airport has added 480,655 sq. ft of terminal and hotel space (Harvey Milk Terminal 1 and the Grand Hyatt) in the past two years, SFO’s emissions have not seen a pandemic decline and instead saw a 4% increase in emissions relative to 1990 levels.

Figure 1 – Historical Airport-Controlled (Scope 1 & 2) Emissions, 1990-FY 2021



reduced emissions by
35%
 =
1,300 HOMES
 annual energy use¹

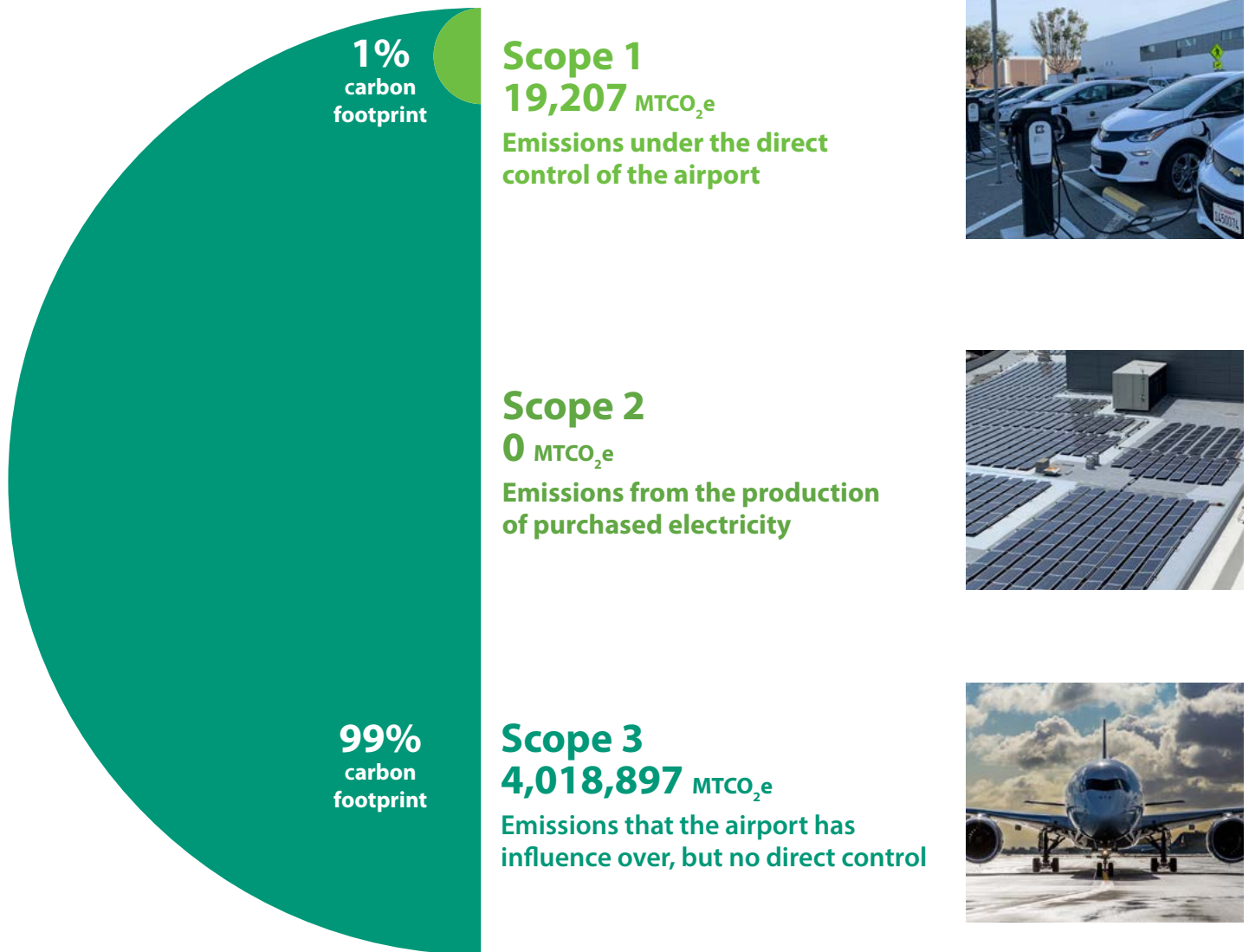
¹ USEPA. (March 2022). Greenhouse Gases Equivalencies Calculator. <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

FY 2021 Emissions by Scope

As Figure 2 shows, the Airport's operations generated 19,207 MTCO₂e in FY 2021. In total, Scope 1 emissions make up less than 1% of the Airport's carbon footprint. Scope 2 emissions have been zero since 2012, due to the Airport's purchase of 100% carbon-free energy (produced from a resource that generates no GHGs) from the San Francisco Public Utilities Commission's Hetch Hetchy Power.

Beginning in FY 2021, the Airport began tracking all emissions from departing flights as part of its carbon footprint. As a result, reported Scope 3 emissions were 4,018,897 MTCO₂e in FY 2021, an increase of 223% from FY 2020's Scope 3 emissions which only included aircraft LTO activity.

Figure 2 – Emissions Scope Definitions and FY 2021 Emission Results Summary





SCOPE 1

AIRPORT-CONTROLLED

Scope 1: Airport-Controlled Emissions & Strategies

Scope 1 emissions are defined as emissions that arise from activities within the Airport’s control. As Figure 3 shows, of the Airport’s Scope 1 emissions, almost 90% came from the burning of natural gas for heating and cooling of buildings. Of that, 85% was consumed at the Airport’s Central Utility Plant (CUP) for the terminal complex.

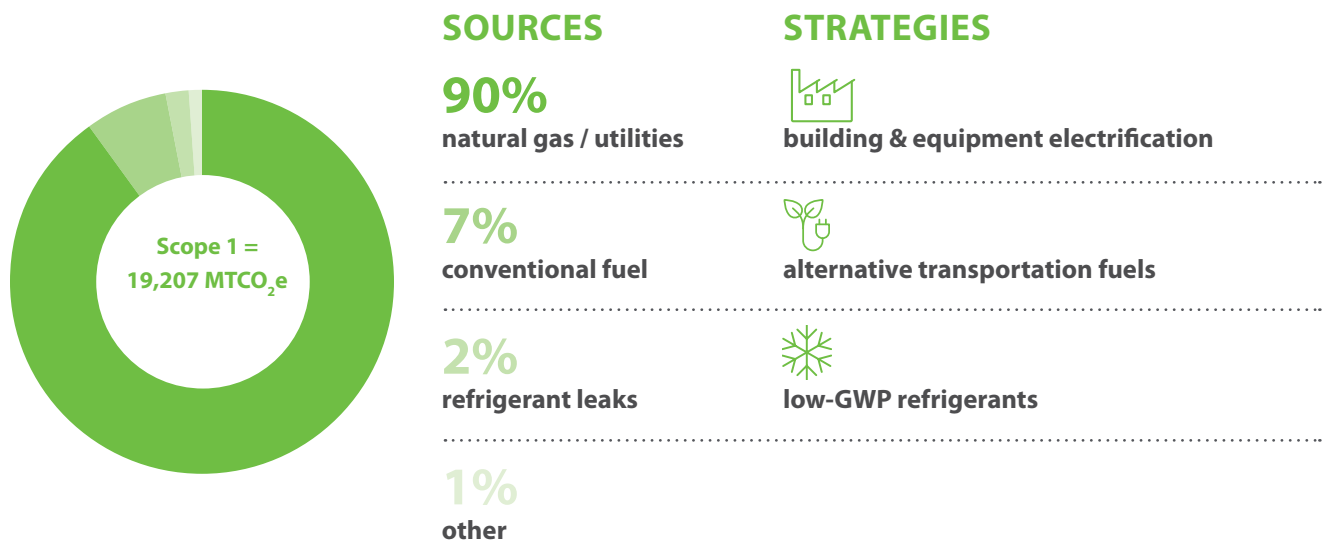
Emissions from fleet fuel consumption comprised the second-highest (7%) source of Scope 1 emissions. Of these emissions, 69% were from the combustion of gasoline, mostly for light trucks and sport utility vehicle (SUVs). In FY 2021, SFO saw a decrease in emissions from gasoline consumption and fugitive refrigerant gas loss compared to FY 2020. Figure 3 describes FY 2021 Scope 1 emissions and strategies designed to address them.

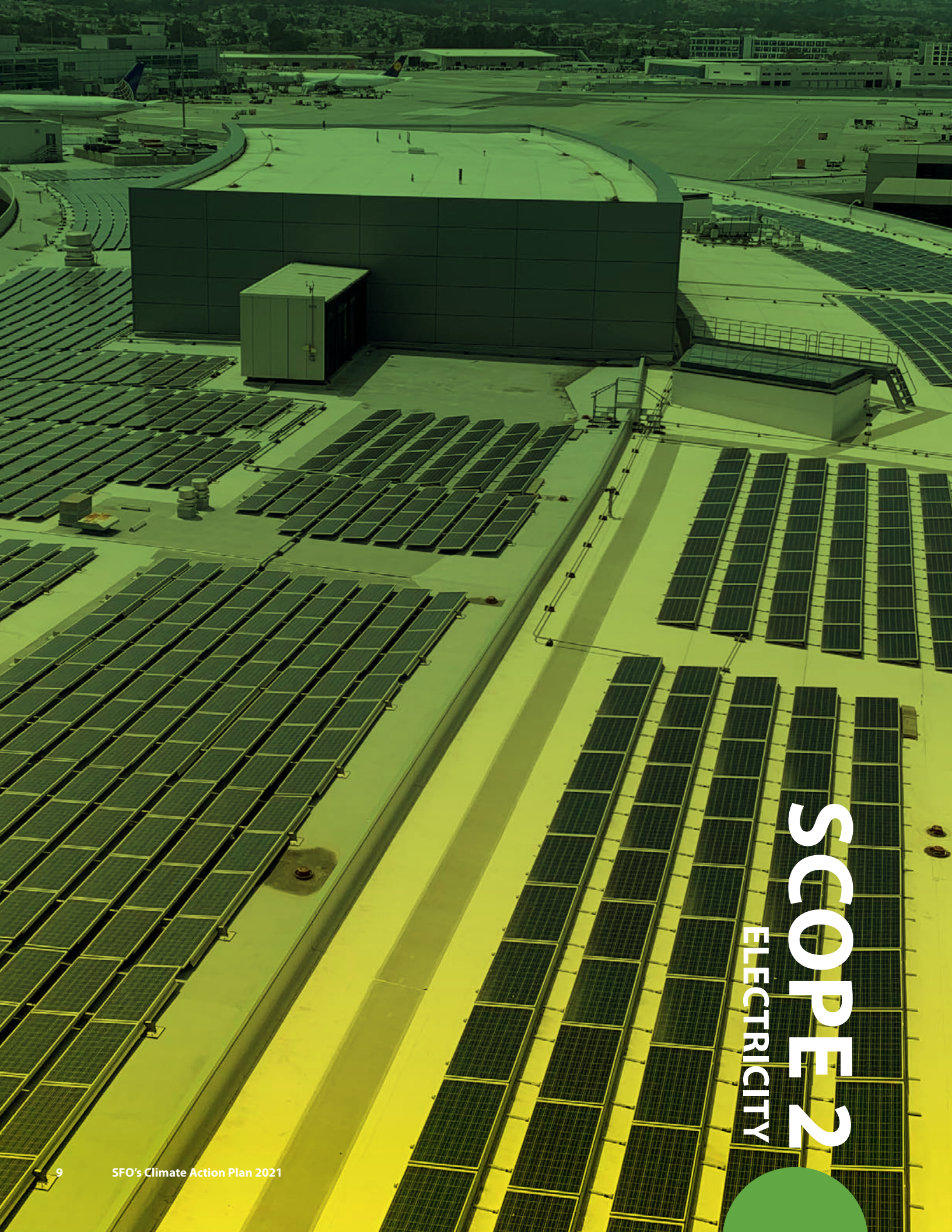
Scope 1 Strategies

The Airport’s strategies to reduce each source of emissions include:

- Building Electrification:** SFO recently completed two key studies to determine the future potential for an all-electric, zero-emission CUP in line with the City and County of San Francisco’s new all-electric building requirement. Additionally, the Airport has developed an [Electrification Action Plan](#) that outlines tasks needed to move SFO’s 100+ existing buildings to all-electric.
- Alternative Transportation Fuels:** SFO’s heavy-duty vehicles operate on renewable diesel and landfill-derived compressed natural gas (CNG), leaving only light-duty vehicles powered by fossil fuels (gasoline). SFO is implementing a [Zero-Emission Vehicle \(ZEV\) Readiness Roadmap](#) that presents a strategy for SFO to expand the use of ZEVs campus-wide with associated infrastructure. SFO also added 7 light duty EVs for an overall 36% light-duty fleet electrification. SFO ordered 11 additional EVs, but procurement has been delayed due to supply chain issues.
- Low-GWP Refrigerants:** A new CUP design would consider the use of low-Global Warming Potential (GWP) refrigerants. While R-134a has a high GWP of 1430, new alternative refrigerants are becoming commercially available that have much lower GWP. Replacing existing aged equipment with new equipment is also expected to dramatically reduce leaks.

Figure 3 – Scope 1: Breakdown of Airport-Controlled Emission Sources & Mitigation Strategies





SCOPE 2

ELECTRICITY

Scope 2: Electricity Emissions & Strategies

Scope 2 emissions arise from the use of purchased electricity at the Airport. Since SFO has purchased carbon-free (producing no GHG emissions) hydroelectric power from the San Francisco Public Utilities Commission's (SFPUC) Hetch Hetchy Power since 2012, SFO's Scope 2 emissions have been zero for the past 10 years.

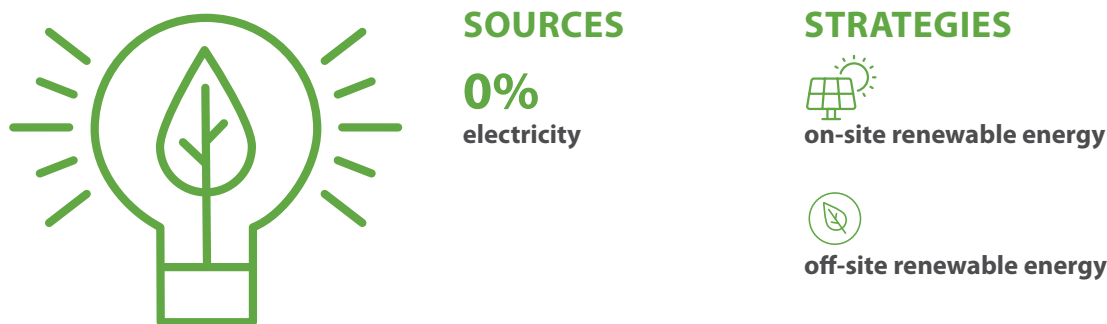
SFO also tracks electricity use over time. Electricity use has declined since FY 2016 despite growth in terminal space. Using resources efficiently is considered the first step in responsible consumption, and as such SFO is prioritizing reducing its energy usage over time through new high performance buildings and existing building retrofits, retrocommissioning, and optimization.

Scope 2 Strategies

SFO has developed electricity-related plans and targets designed to increase the Airport's use of renewable energy:

- **On-Site Renewable Energy:** SFO currently has 12 solar installations online producing 3 MW annually, and as of FY 2021 was nearing the completion of a Distributed Energy Resources study to evaluate the use of solar power and battery storage on-campus. Results of the study indicate that 49.5 MW of new solar generation capacity could be added to SFO's campus, enabling the Airport to generate enough onsite solar energy to meet 17% of campus energy use.
- **Off-Site Renewable Energy:** For electricity needs beyond what can be produced from on-site renewables, the Airport will evaluate SFPUC Green Tariff options now and in the future to transition to 100% renewable energy.

Figure 4 – Scope 2: Electricity Emission Sources & Mitigation Strategies





SCOPE 3
AIRPORT-INFLUENCED

Scope 3: Airport-Influenced Emissions & Strategies

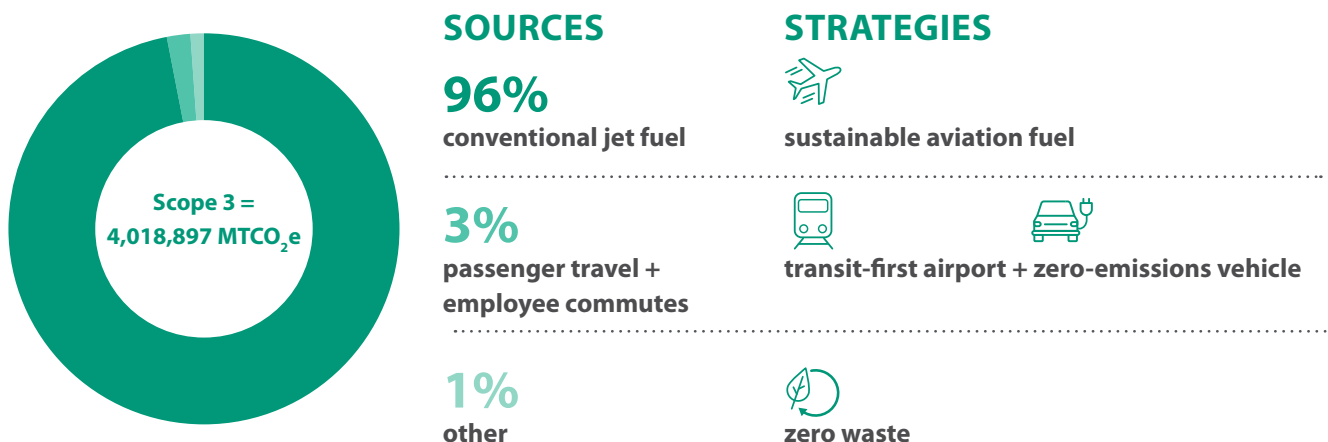
Scope 3 emissions are emissions that are beyond the Airport’s direct control, but which the Airport has some degree of influence over. Approximately 96% of Scope 3 emissions arose as a result of aircraft jet fuel use (full flight, departing flights only), followed by emissions from passenger travel to and from the Airport (2%), employee commutes (1%), and other (1%), which includes landfilled waste, tenant natural gas use, and ground support equipment fuel consumption. Figure 5 displays the sources of Scope 3 emissions for FY 2021, as well as the Airport’s strategies to address them.

Scope 3 Strategies

SFO has developed a suite of strategies to address Scope 3 emissions:

- Sustainable Aviation Fuel (SAF):** SFO is leading the world’s largest initiative to develop and deploy SAF at an airport, and currently receives the highest volume of SAF of any airport worldwide. Emissions from SAF are estimated to be up to 80% lower than those of conventional aviation fuel, depending on the percentage blend.
- Transit-First Airport:** SFO Lower Emissions via Sustainable Solutions (SFO LESS) Transportation Policy supports and promotes transit use to, from, and within the Airport. Implementing LESS includes consideration of ground transportation and curbside operations policies, electrification of Airport owned and operated vehicles, and accessibility of transit.
- Zero-Emission Vehicles:** SFO’s ZEV Readiness Roadmap aims to deploy nearly 2,000 chargers across SFO’s campus before 2023, electrifying 10% of the Airport’s parking stalls. SFO envisions 14 DC Fast Chargers, available for public use, to support the public, employees, fleet operations, and Ride-hailing Companies. The Airport is also working to deploy 86 airside charging stations in Boarding Areas D and G to enable expanded use of electric ground support equipment (eGSE).
- Zero Waste:** SFO is working to eliminate the use of plastic foodware and moving to fully compostable materials, eliminating single-use plastic bottles, improving signage and training, and working to identify and reduce embodied emissions in its material use and construction operations.

Figure 5 – Scope 3: Breakdown of Airport-Influenced Emission Sources & Mitigation Strategies





CLOSING

Closing

SFO strives to drive decarbonization of the broader aviation industry, as evidenced by pursuing goals like achieving ACA Level 4 certification and implementing the noted strategies above to reach net zero carbon by 2030. Achieving these goals will require significant investments of time, resources, energy, and close coordination with airport and industry stakeholders. SFO's leadership continues its commitment to these climate-critical goals because while they may be complex, they are necessary.

The Airport has been successful in reducing emissions 35% from baseline levels. This FY 2021 Climate Action Plan represents the latest step in SFO's ongoing journey towards a sustainable future. By tracking and reporting on yearly GHG emissions, the Airport can monitor progress over time and adjust strategies as necessary to achieve its climate ambitions in support of the local and global communities it serves.



**For inquiries
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Emissions by the Numbers

The following tables detail the emissions (in metric tons of carbon dioxide equivalent, or MTCO₂e) by scope (Table 1), and broken down by emission sources for Scope 1 (Table 2), Scope 2 (Table 3), and Scope 3 (Table 4).

Table 1: FY 2021 GHG Emissions by Scope (MTCO₂e)

EMISSION SCOPES	1990	FY20	FY21	% OF FY21 TOTAL	YOY % CHANGE
Scope 1 Emissions	21,013	18,115	19,207	0.5%	6%
Scope 2 Emissions	8,689	-	-	0.0%	-
Scope 3 Emissions	1,209,471	1,262,663	4,038,104	99.5%	220% ¹
TOTAL	1,239,173	1,280,778	4,057,311		

¹ Aircraft methodology changed for FY21 to include full flight emissions (departing flights only).

Table 2: Scope 1 (Airport-Controlled) GHG Emissions (MTCO₂e)

EMISSIONS SOURCE	1990	FY20	FY21	% OF FY21 TOTAL ²	YOY % CHANGE
Central Plant Natural Gas	9,020	15,008	16,326	85%	9%
Transportation Fuels ¹	4,560	1,357	1,415	7%	4%
Non-Central Plant Natural Gas	617	780	854	4%	9%
Fugitive Refrigerants	6,559	768	456	2%	-41%
Generator Fuels	171	166	100	1%	-40%
Wastewater Treatment	86	36	55	0.3%	53% ³
TOTAL	21,013	18,155	19,207		

¹ Transportation fuels include gasoline, renewable diesel, and landfill-CNG.

² Values may not total due to rounding.

³ FY20 saw a pandemic-related decrease in wastewater treatment emissions. When passengers and staff returned in FY21, wastewater treatment emissions increased.

Table 3: Scope 2 Electricity Use (kWh) and GHG Emissions (MTCO₂e)

	1990	FY20	FY21	% OF FY21 TOTAL	YOY % CHANGE
Electricity Purchases (kWh)	131,435	162,303	150,338	100%	-7%
Electricity Emissions (MTCO ₂ e) ¹	8,689	-	-	-	-
TOTAL	8,689	0	0		

¹ SFO's electricity has been from carbon-free hydropower since 2012.

Table 4: Scope 3 (Airport-Influenced) GHG Emissions (MTCO₂e)

EMISSIONS SOURCE	1990	FY20	FY21	% OF FY21 TOTAL ²	YOY % CHANGE
Aircraft ¹	786,277	893,936	3,873,022	96%	333%
Passenger Travel	392,149	258,953	95,708	2%	-63%
Tenant Natural Gas Use	2,067	29,228	26,806	1%	-8%
Tenant Employee Commute	22,210	38,578	13,018	0.3%	-66%
Ground Support Equipment (eGSE)	5,336	11,448	4,660	0.1%	-59%
SFO Employee Commute	1,961	2,232	1,780	0.04%	-20%
Solid Waste	6,055	6,146	1,925	0.05%	-69%
Other	2,572	4,028	1,979	0.05%	-51%
TOTAL	1,200,627	1,244,549	4,018,897		

¹ Aircraft methodology changed for FY21 to include full flight emissions (departing flights only).

² Values may not total due to rounding.