



2018 Progress Report: **Sustainability**

BART 2018 Sustainability Highlights

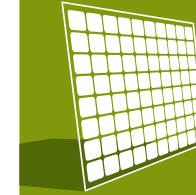


10,820 sqft

of storm water
green infrastructure
installed



2 MW
solar panels installed



Antioch=1.1 MW DC
Lafayette=1.1 MW DC

Sustainable Sourcing



In FY18 (July 2017 to June 2018),
the District purchased 2218 cases of 30%
recycled paper, avoiding over 3 million pages
of new paper created

266 bike spaces added

2 NEW
bike stations



Pleasant Hill / Downtown Berkeley

16 NEW EV SPACES
installed



For a total of 58
in the system



94%

of BART's wholesale
electricity purchased is
low-/zero-carbon

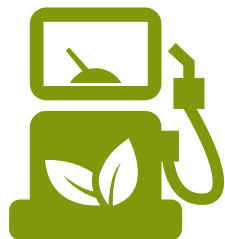


320,872 MT
CO2e emissions
avoided

27 lbs of CO2e emissions avoided
in one average round trip

Expanded Composting in Administrative Offices

Composting is now available at
kitchens and main conference
rooms of the administrative
buildings. Bin signage and notice
to employees were done to guide
users with the new bins.



149,594
gallons

of conventional diesel
avoided by switching to
renewable



186 mpg
fuel efficiency
equivalent

as compared to average car,
single occupancy



Fleet of the Future

First 50 cars
accepted for
service
CY2018



**BART app and
trip planner launched**

November 2018

Introduction

The *2018 Progress Report: Sustainability* communicates progress in BART's Sustainability program. The purpose of the report is to provide transparency to the public and hold accountable BART's commitment to the goals of the program. The sustainability program aims to support a sustainable, healthy, and vibrant Bay Area through actions and investments that create a less car dependent region and a greener transportation system.

Report Format

The report is organized by a collection of case studies that highlight BART's achievements in sustainability for the reporting period. Metric and action plan status information was not included in this report but is planned for in future reports.

About the Sustainability Program

In concert with the sustainability policy, adopted in 2017, BART published a 10-year sustainability action plan that details the targets, current progress, and future actions to integrate sustainability as a standard practice throughout BART. The plan was created with input from numerous BART departments as well as in coordination with broader regional and American Public Transportation Association (APTA) sustainability goals. The detailed roadmap includes performance metrics to measure outcomes of actions that support BART's commitment to provide safe, affordable, equitable, and environmentally-friendly transit.

The policy and action plan may be found at <https://www.bart.gov/sustainability/policies>

Reporting period

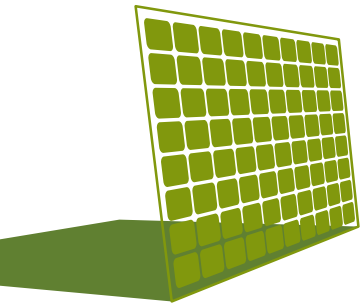
The report focuses on efforts from the 2018 calendar year (i.e., January 1 to December 31).

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The California Transportation Foundation named BART's Warm Springs Extension Project of the Year



Warm Springs Extension Project

One of BART's newest stations, the Warm Springs/South Fremont Station, is the first BART station to be certified LEED (Silver). Sustainability was a top priority for this project and was carefully considered in every step of the project.

The following are key sustainability features of the project:

- 42 solar-powered electric vehicle charging stations.
- The station is fully accessible to pedestrians and bicyclists, and includes bike lockers and racks, elevators, and escalators.
- The station site includes solar panels, installed on the roof of the station and on several parking lot canopies. The solar panels are 550 kilowatt (kW) direct current (DC) in size.
- BART has installed bioswales throughout the parking lot that naturally filter silt and pollutants in surface run-off water before it enters the Bay watershed. The bioswales utilize native and drought-tolerant landscaping with native Juncus shade grass and fescue grasses. The bioswales soak up and filter water, as part of a drainage system that could otherwise intrude into car, bike, and bus paths, while also removing pollutants that the rain can carry into the Bay.
- A section of the trackway features a layer of shredded "tire-derived aggregate" that both mitigates operational vibration and has taken approximately 130,000 car tires out of the waste stream. The project also constructed a beautiful 10-acre wetland habitat area next to Fremont Central Park to mitigate some of the project's biological impacts.

The station also boosts the Warm Springs Innovation District, which will include new housing, including affordable units, and incubator-type business hubs. A boardwalk will lead from the station through what is expected to be a vibrant and thriving live-work community.

The California Transportation Foundation has named BART's Warm Springs Extension as its Project of the Year for 2017. The CTF awards recognize the best projects, people, and organizations in California's transportation industry. The winners were selected from among more than 90 nominees.

BART's Warm Springs Extension includes 5.4 miles of new track that extends from the Fremont Station to the new Warm Springs/South Fremont Station. The project came in at more than \$100 million under the original budget of \$890 million.

Full story: <https://www.bart.gov/news/articles/2018/news20180523>

Sources: <https://www.bart.gov/news/articles/2018/news20180523>

Sources: <https://www.bart.gov/news/articles/2017/news20170327>



From Conventional to Renewable Diesel

In March 2018, BART made the switch from fossil diesel to renewable diesel. BART uses diesel to power eBART trains and non-revenue heavy equipment. Choosing renewable diesel over fossil diesel supports reduction in global climate emissions because the carbon dioxide released from combustion is offset by the carbon dioxide absorbed from growing the biomass to produce the fuel.

Fossil diesel is, by contrast, business-as-usual and does not contribute to reduction in global emissions. Renewable diesel is made from organic biomass as opposed to fossil fuels. Furthermore, renewable diesel differs from traditional biodiesel because the production process, cleanliness, stability, and quality are of higher grade than that of biodiesel. In terms of chemical make up, renewable diesel is the same as fossil diesel. From a life cycle perspective, renewable diesel has a lower carbon intensity (approximately one-third to two-thirds) compared to conventional diesel.

In CY2018 BART avoided 149,594 gallons of conventional fossil fuel diesel by switching to renewable diesel.

Choosing renewable diesel was also in alignment with BART's sustainability policy which includes goals to "reduce harmful emissions and waste generation."

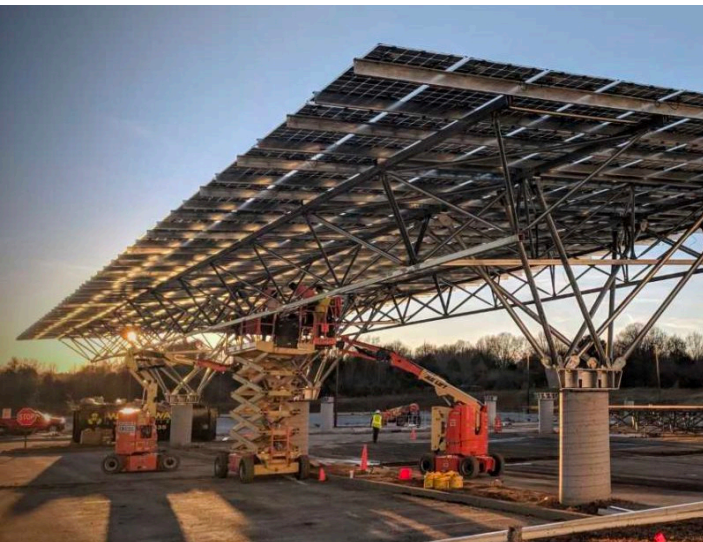
BART operates a large number of diesel-powered non-revenue heavy equipment including trucks, generators, and fixed-rail and construction equipment. These assets are essential to maintaining and supporting the BART system.

The switch to renewable diesel comes in concert with the new eBART service to Antioch which opened May 26, 2018. The extension uses a different type of train called a Diesel Multiple Unit (DMU) which relies on diesel fuel as opposed to electricity. These trains are state-of-the art, clean, and comfortable. They are environmentally friendly and meet the EPA's strictest emissions standards.

The service between the Pittsburg/Bay Point Station and Antioch is 10 miles long and added two new stations, the Pittsburg Center Station and the Antioch Station. As of FY19, average weekday ridership was 2,896 exits.

**In CY2018 BART avoided
149,594 gallons of fossil
fuel diesel by switching to
renewable diesel**





Solar carports generate the equivalent of powering 200 homes with renewable energy each year



Energy Efficiency and Distributed Generation

In 2018 BART continued to make headway in energy efficiency and distributed generation. BART completed several projects, including switching out old lighting for new energy-efficient LED lighting and installing multiple on-site solar carports.

At the South Hayward station parking lots, BART switched out old high-pressure sodium (HPS) lights for 106 modern light-emitting diode (LED) light fixtures which save money on energy costs, reduce disposal of hazardous waste, and provide brighter, more reliable lighting that improves safety and security for riders. LED lights consume less energy and are expected to last as long as 20 years (or 100,000 hrs as compared to 24,000 hrs for HPS lights). LEDs also provide superior lighting due to their inherent directionality, better control of light and better color rendition.

BART completed multiple on-site solar projects which promote distributed energy generation in Antioch and Lafayette. The Antioch and Lafayette on-site solar projects are solar carports that sit atop hundreds of parking spaces. These solar carports provide covered parking to BART riders' vehicles while generating cost effective renewable energy. Each project is 1.1 megawatt (MW) direct current (DC) of solar carports which generate more than enough energy to power each station, or the equivalent of powering 200 homes with renewable energy each year.

Source: <https://www.bart.gov/news/articles/2018/news20180319>

Source: <https://www.mercurynews.com/2017/01/18/lafayette-carport-solar-panels-to-go-up-at-bart-station/>

Source: <https://www.bart.gov/sustainability/energy>



Fleet of the Future trains consume approximately 10% less energy than the legacy trains, based on test track results



Fleet of the Future Train Cars

In 2018, BART introduced the first new Fleet of the Future (FOTF) train cars to service. The new cars feature a wide spectrum of improvements over BART's legacy fleet, currently one of the oldest fleets in the nation.

Continuing its commitment to sustainability, BART worked with train manufacturer Bombardier to take a lifecycle approach—ensuring that the train cars reduce energy use, pollution and costs, not only during their useful life but during the production stage and after the new train cars are eventually retired.

BART's infrastructure requires the train cars to be extremely lightweight¹. To meet this requirement, most of the exterior of the new train cars is constructed out of aluminum. Aluminum is abundant, doesn't rust, and when properly finished, reflects heat and light, keeping the train cars cool. It is lightweight but strong, yet fairly easy to work with, reducing the energy investment during the manufacturing process. Additionally, aluminum is easily and readily recyclable, making it very low impact when the train cars are eventually retired and dismantled.

Furthermore, in addition to the natural heat and light reflection properties of aluminum, each train car is equipped with a white roof that will deflect heat and light away from the interior of the train. The white roof will help lessen the load on the interior cooling system, keeping passengers comfortable and decreasing energy consumption.

The new train cars use LED lights which are extremely efficient and long-lasting. Additionally, the lighting system senses the amount of available sunlight in each car and adjusts lighting intensity automatically, saving additional energy.

While the new trains are more efficient than the old fleet during acceleration and maintaining speed, they gain most of their efficiency by improving the regenerative braking system that the trains currently use. BART trains convert their kinetic energy of motion into electrical energy as the trains slow down. The energy regenerated during this process is returned to the power distribution system where it is used by other trains.

¹Because BART train cars are so lightweight (weighing 15,000-20,000 lbs. less than a Washington Metro car, for example) they use significantly less energy over their life cycle.

Source: <https://www.bart.gov/news/articles/2018/news20180119>

Source: www.bart.gov/cars

Source: https://www.bart.gov/sites/default/files/docs/FoF_Sustainability_web.pdf



The First BART Bike Station in Contra Costa County

BART took a major step forward in promoting bicycle access in Contra Costa County by opening its newest bike station. The new facility, built in the Contra Costa Centre Transit Village at the Pleasant Hill/Contra Costa Centre BART Station, is the first to be located in the county and will benefit hundreds of BART riders every day.

The new facility features space for 215 bikes and builds on the existing bicycle capacity at the Pleasant Hill/Contra Costa Centre Station. That existing capacity includes 220 outdoor rack spaces, 88 BikeLink lockers¹, and 10 solar-powered high-security Bikekeep racks. Most of those spaces fill up early in the morning on weekdays, which demonstrates the need for the additional bike parking provided by the new station.

The new facility is the seventh bike station in the BART system. The others are at 19th Street, Ashby, Civic Center, Downtown Berkeley, Embarcadero, and Fruitvale Stations.

The new facility features space for 215 bikes and builds on the existing bicycle capacity at the station



¹Original story noted 150 BikeLink lockers. Some were moved to other locations in the District.



Stormwater Management

Improved stormwater management protects water quality and associated aquatic habitat. Older conventional designs for storm drainage create impervious surfaces and direct the runoff to stormwater drain systems without treatment. Low impact development (LID) takes a different approach by viewing stormwater as a resource rather than a waste product.

LID promotes the natural movement of water within an ecosystem. LIDs are designed to treat the runoff from the parking lot areas from potential stormwater contaminants including hydrocarbons, sediments, heavy metals, trash and debris, oil and grease, and nutrients.

BART completed three major projects in 2018 with LID including the Oakland Spur Track, Berkeley Plaza, and eBART maintenance facility. In total, 10,820 square feet of LID were installed, which ensures the stormwater runoff from each site is captured and treated.

The most common LID features are bioswales, which are planted depressions that collect and slowly absorb stormwater runoff. Runoff from the site enters the bioswales through curb cuts and seeps through different layers designed to filter and remove pollutants. Plant roots also create conditions in the soil that promote infiltration and support microbes that further reduce pollutants.

10,820 square feet of LID were installed, ensuring the stormwater runoff from each site is captured and treated



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Zero- and Low-Carbon Electricity

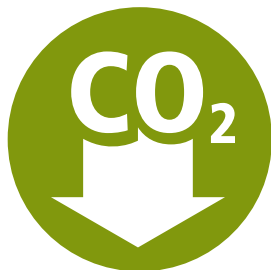
2018 is the first full calendar year following Board adoption of BART's Wholesale Electricity Portfolio Policy which establishes a commitment to achieve a portfolio average emission factor no greater than 100 lbs-CO₂e/MWh over an eight-year period, from calendar years 2017 through 2024.

In 2018, the average emission factor for BART's wholesale electric portfolio was 62 lbs-CO₂e/MWh. This was achieved through the procurement of low- and zero-carbon sources of electricity including solar, hydroelectric, and other low carbon imports from the Pacific Northwest. Having a low carbon footprint with low- and zero-carbon sources like Gridley solar (left) makes BART a sustainable transit solution in the Bay Area.

BART consumes approximately 410,000 megawatt hours (MWh) of electricity annually, making it one of Northern California's largest end-users.

In December 2017, BART executed two wholesale renewable power purchase agreements (PPAs)—a 45 megawatt PPA of solar energy and a 62 megawatt PPA of wind energy. PPAs are long-term supply contracts to buy electricity from a particular electricity producer. Together, these PPAs will serve approximately 75% of BART's energy needs over a 20-year period beginning in 2021. Both projects are currently under development in California's Central Valley and are slated for commercial operation in 2021.

BART utilizes many low- and zero-carbon sources of electricity including solar, hydroelectric, and other low carbon sources



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Downtown Berkeley BART Plaza and Transit Area Improvement Project

The new Downtown Berkeley BART Station Plaza opened to the public on October 18, 2018, featuring enhanced bus and BART connectivity, pedestrian improvements and modern environmental elements.

The renewed plaza features an inviting open layout of granite aggregate pavers of neutral color tones. The open layout and glass entrance support the safety of the plaza by maintaining open sight lines at the street level. In addition, the transparency of the glass entrance allows for natural light to enter the station and reduce dependence on artificial lighting. Energy-efficient LEDs are used throughout the plaza to reduce energy requirements. The two new bus shelters replace the existing one and improve BART-to-bus connections. The bus shelters are twice as large as the one prior. The plaza is accented with public art and drought-resistant landscaping.

BART and the City of Berkeley first began their collaboration in 2006 with initial planning and design. Using a community-based design process, the goals were to enhance multi-modal transit access to expand ridership; increase accessibility for pedestrians and bicyclists, reorganize the public space to better accommodate transit users and, importantly, to reflect the identity of the community and history of Downtown Berkeley.

Construction on the project began in July of 2016. It was funded by State Prop 1B and local area grants including Measure F. The overall budget was \$13 million including \$9.4 million for construction. The project was completed within budget.

The project enhances multi-modal transit access, increases accessibility, and reorganizes the public space to better accommodate transit users



