San Joaquin Regional Rail Commission (SJRRC)

Climate Action Plan Framework

April 15, 2022

San Joaquin Regional Rail Commission

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Executive Summary

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- SJRRC is committed to reducing operational GHG emissions by 50% below 2005 base year levels. This CAP Framework is based on a partial GHG inventory that includes the largest operational GHG emissions sources – fuel use in locomotives and buses/shuttles
  - 2005 GHG emissions – ~4,800 MT CO_2e/yr
  - 2019 GHG emissions – ~5,800 MT CO_2e/yr
- Emissions from locomotives and buses/shuttles are forecast to increase through 2030, if base case equipment and fuel sources remain the same, based on rail and bus/shuttle service expansion plans
  - 2030 GHG emissions – ~19,200 MT CO_2e/yr
- To achieve the 2030 GHG emissions target level of 2,396 MT CO_2e/yr, the agency will need to reduce emissions by approximately 16,800 MT CO_2e/yr below the 2030 forecast emissions levels
- SJRRC is committed to using 100% renewable diesel in its locomotive and bus/shuttle fleets prior to the 2030 GHG target year, which will reduce operational emissions to approximately 200 MT CO_2e/yr – 96.5% below 2005 levels
  - The agency is also committed to working with the State to meet its goal to transition all off-road vehicles to zero-emissions technology by 2035

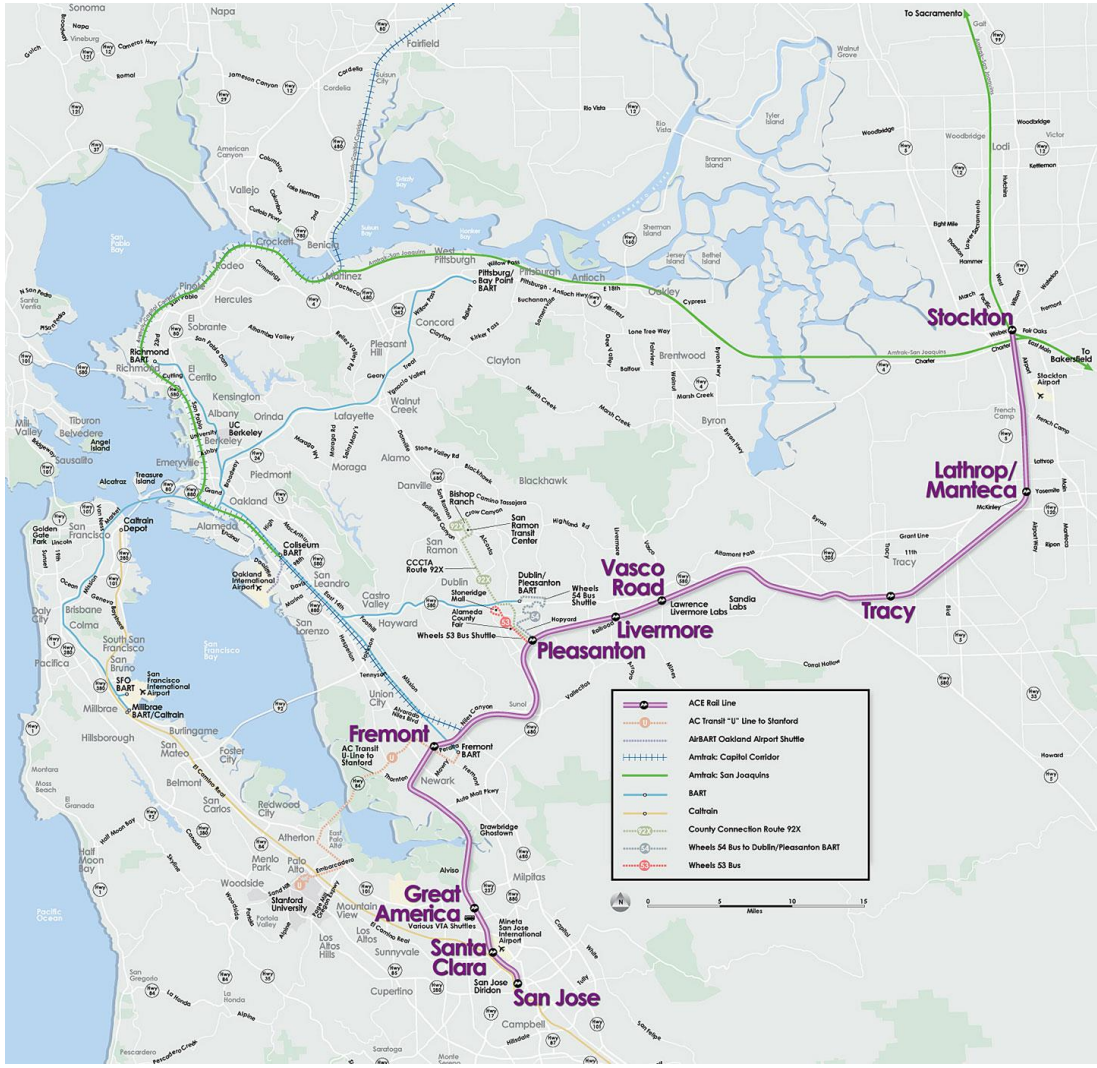
Agency Background

Climate Action Plan Framework Purpose

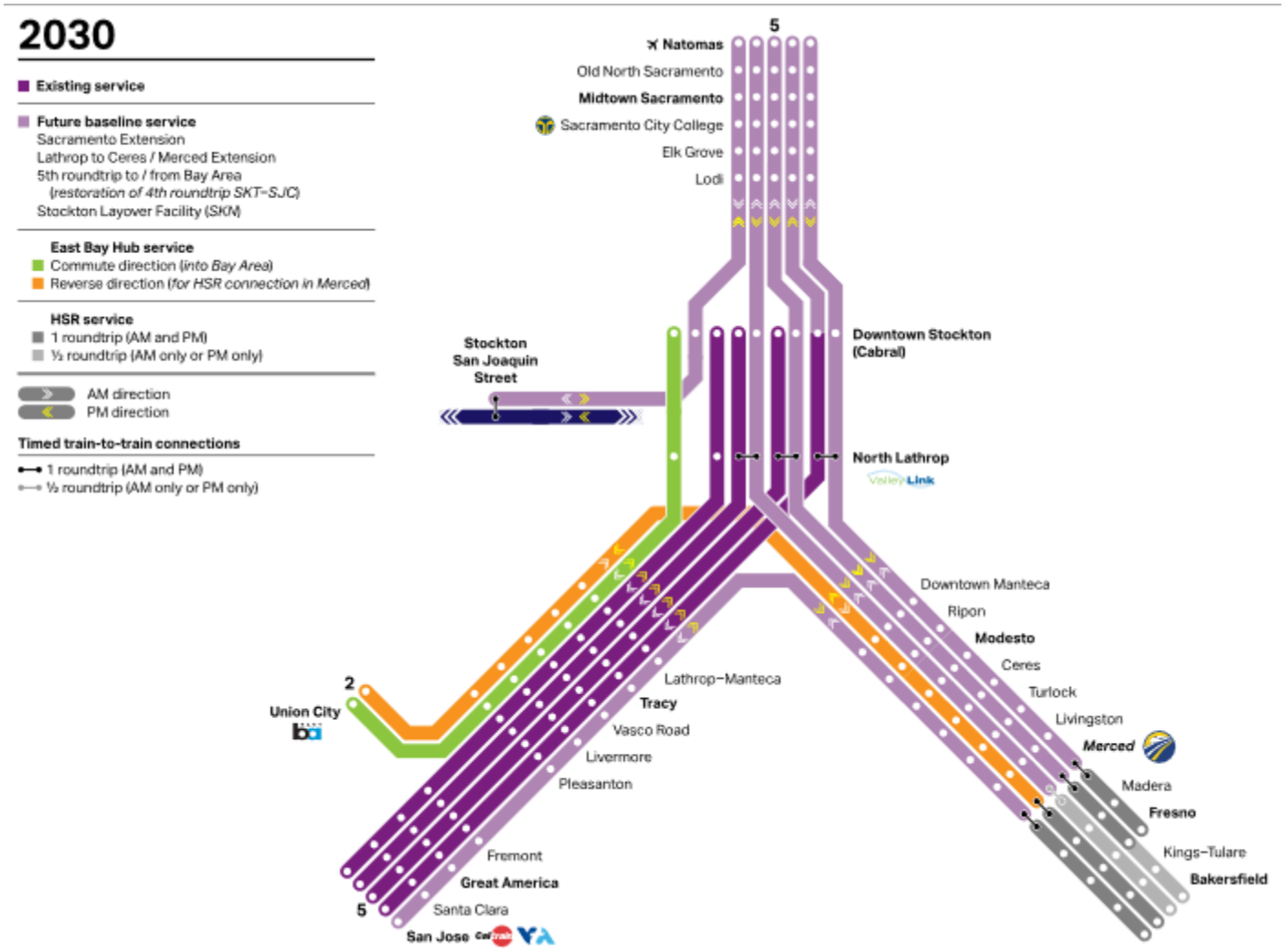
- The San Joaquin Regional Rail Commission (SJRRC) developed this Climate Action Plan (CAP) Framework in response to the Federal Transit Administration (FTA) Climate Challenge that recommends transit agencies develop CAPs by April 2022 to define strategies that achieve greenhouse gas (GHG) reductions in line with the Biden administration's national goals (i.e., 50-52% below 2005 GHG levels).
- This framework is a precursor to a more complete CAP that can be developed pending the identification of additional funding sources. It provides an initial analysis of a sub-set of operational GHG emissions sources and corresponding reduction opportunities that can be further expanded following the FTA Climate Challenge period.

Agency Service

- SJRRC runs the ACE commuter rail service between Stockton and San José as well as connecting bus/shuttle routes.
- LAVTA buses/shuttles connect at Pleasanton with ACE commuter rail service to provide connections to West Dublin/Pleasanton BART and the Hacienda business park.
- VTA buses/shuttles connect at Great America Station with ACE Commuter rail service to provide various connections to Silicon Valley.



ACE 2030 Vision



GHG Context

GHG Inventory Context

- SJRRC analyzed a sub-set of GHG emissions activities for 2005 and 2019 to define the magnitude of contribution from the most significant operational activity source - fuel use from rail and bus/shuttle service.
- Pending identification of future funding sources, SJRRC will expand its scope of GHG emissions analysis in future years to include other emissions activity sources, such as:
  - Stationary energy use in buildings/facilities
  - Other fleet vehicles
  - Off-road equipment

GHG Inventory Protocol

- Several GHG inventory protocol options are available to guide development of the agency's GHG inventory, including The Climate Registry General Reporting Protocol (GRP) and the Corporate Standard. Both are applicable options to guide the agency's future full inventory development.
- Inventory protocols describe what emissions sources should be included for inventory completeness. For example, the GRP Required Sources for Completeness include:
  - Mobile combustion – e.g., trains, buses, agency vehicle fleet, off-road equipment
  - Stationary combustion (buildings/facilities) – e.g., natural gas, propane
  - Purchased electricity
  - Physical & chemical processes (e.g., cement manufacturing)
  - Fugitive sources (e.g., natural distribution leaks, refrigerant use)

GHG Inventory Protocol

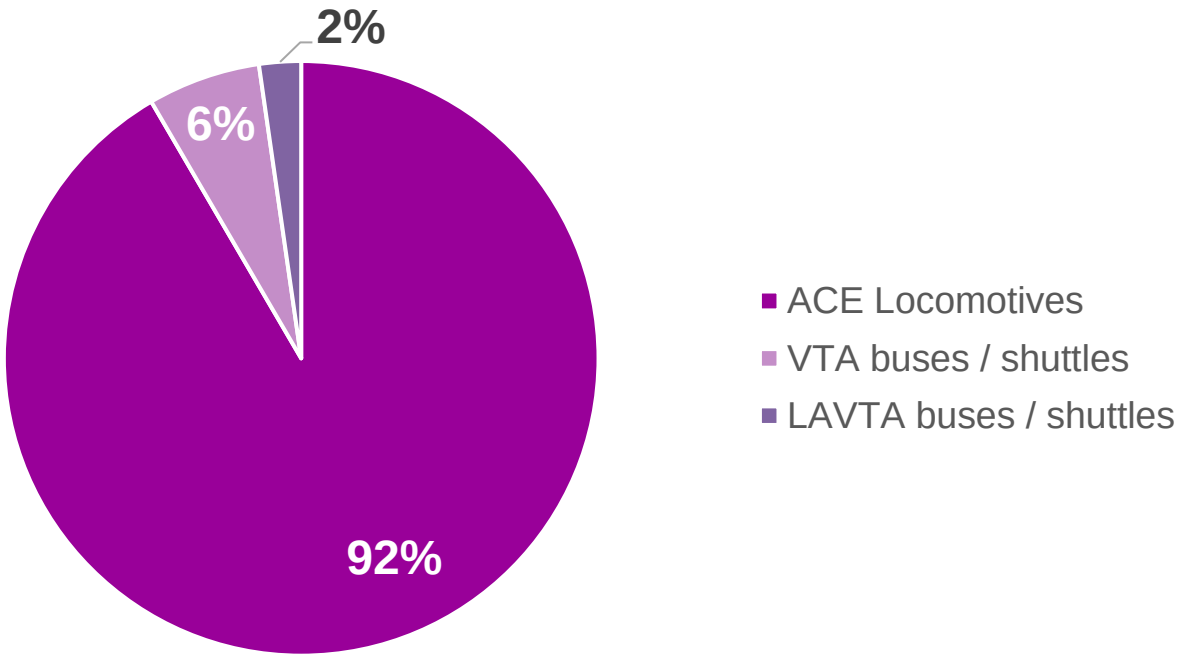
- Inventory protocols often identify other ‘Optional Sources’ that can be included in a GHG inventory to provide additional context or tell a more complete story about an organization’s GHG contributions.
- Examples of optional emissions sources from the Corporate Standard include:
  - Waste disposal
  - Employee commute, business travel
  - Electricity transmission & distribution loss
- As part of future GHG inventory development processes, the agency will evaluate what new emissions sources can feasibly be integrated into the initial GHG inventory developed as part of this CAP Framework, potentially including some optional sources. These future inventory efforts are contingent upon funding availability and data availability and completeness (e.g., 2005 base year, current years).

Partial GHG Inventory

- A sub-set of the GRP/Corporate Standard required emission sources were evaluated in the CAP Framework to understand the agency's 2005 base year and 2019 GHG emissions levels.
  - The sub-set of emissions selected are assumed to be the greatest contributors to operational GHG emissions, are directly relevant to the agency's primary service, and were generally supported by readily available data.
- The partial inventory includes mobile combustion from:
  - Locomotives
    - ACE Rail (diesel fuel use)
  - Buses/Shuttles
    - LAVTA (diesel fuel use)
    - VTA (propane fuel use)

2005 Base Year GHG Emissions

- In 2005, 92% of the agency's GHG emissions came from diesel fuel combustion in locomotives while the remaining 8% were from diesel and liquefied petroleum gas (LPG or propane), use in buses and shuttles, respectively.
- These emissions represent the partial GHG inventory developed for this initial CAP Framework, not the agency's total operational emissions.



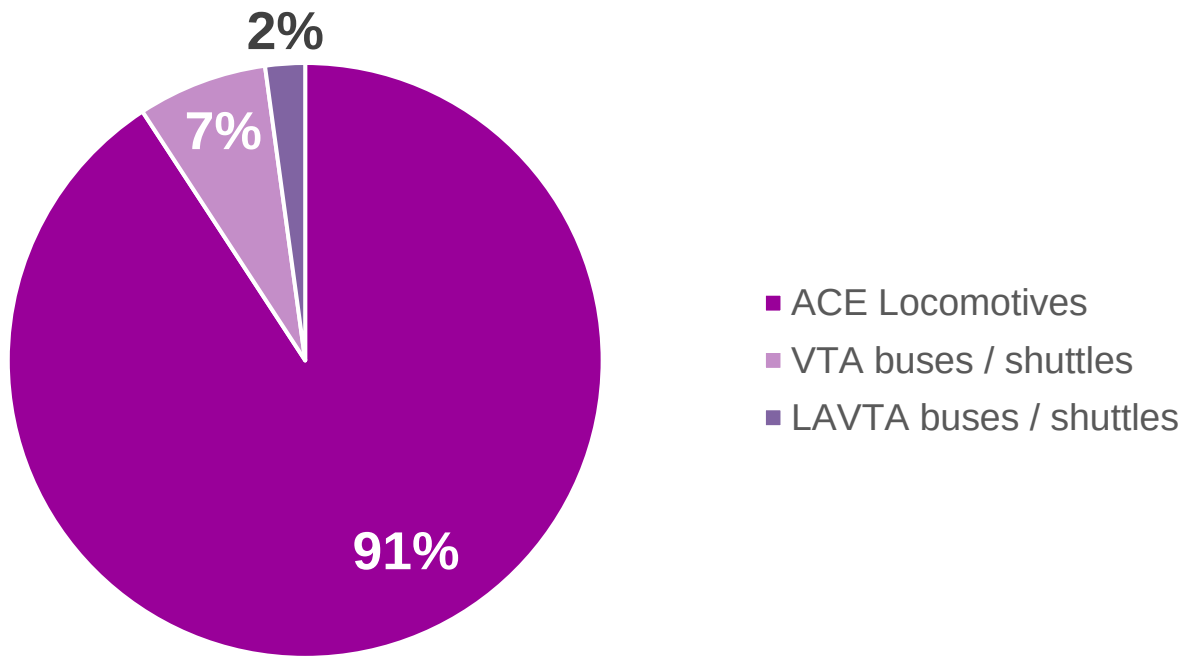
2005 Base Year GHG Emissions

- 2005 base year emissions totaled nearly 4,800 metric tons of carbon dioxide equivalent (MT CO_2e/yr).
- 2005 data was unavailable for the VTA shuttle service due to changes in operating service providers. Instead, calendar year 2010 data was used for this initial GHG inventory.

Emissions Source	Fuel Use (gal)	Fuel Type	MT CO_2e/yr
Locomotives	**425,958**		**4,388**
ACE Rail	425,958	Diesel	4,388
Buses / Shuttles	**62,237**		**403**
LAVTA	10,643	Diesel	109
VTA	51,594	LPG	294
Total			**4,791**

2019 GHG Emissions

- In 2019, approximately 91% of the agency's GHG emissions were from locomotive diesel fuel use with the remaining 9% from diesel and LPG use in buses and shuttles, respectively.



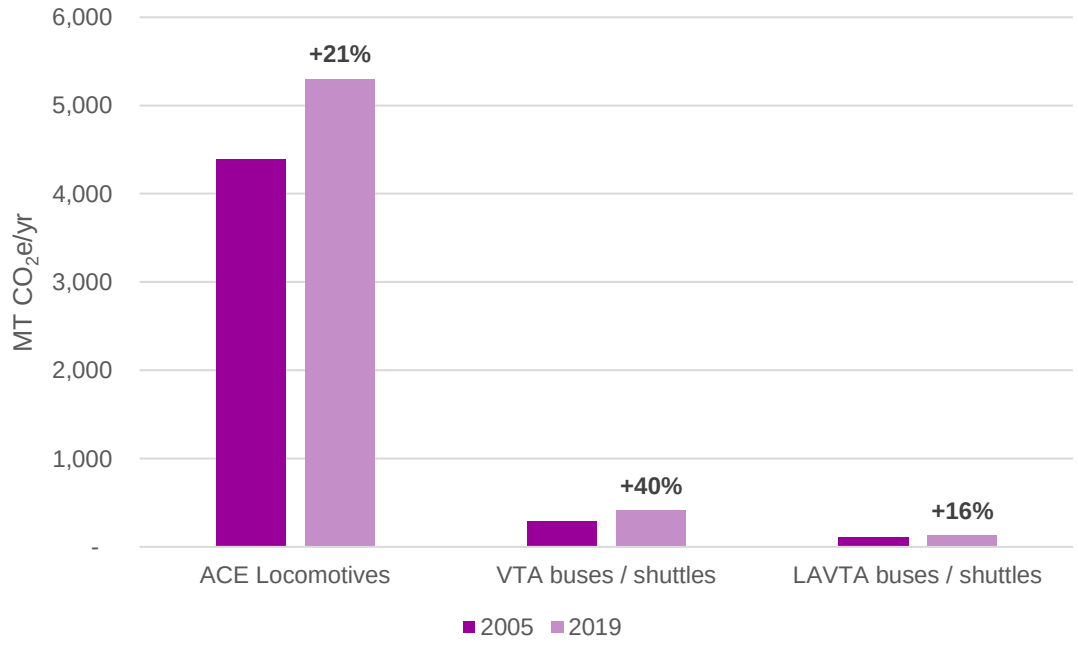
2019 GHG Emissions

- 2019 emissions totaled approximately 5,800 MT CO_2e/yr, or nearly 22% higher than in 2005.

Emissions Source	Fuel Use (gal)	Fuel Type	MT CO_2e/yr
Locomotives	**514,210**		**5,297**
ACE Rail	514,210	Diesel	5,297
Buses / Shuttles	**84,544**		**538**
LAVTA	12,304	Diesel	126
VTA	72,240	LPG	412
Total			**5,835**

2005 & 2019 Emissions Comparison

- From 2005 to 2019, locomotive emissions increased 21%. This is partially due to an increase in service within the SJRRC system moving from 3 roundtrips to 4 roundtrips between 2005 and 2019.
- VTA shuttle emissions increased 40% and LAVTA bus emissions increased 16% during this same period. Due to base year inventory data limitations, the VTA shuttle emissions growth reflects the change from 2010 (not 2005) to 2019.



2005 and 2019 Inventory Caveats

- The 2005 and 2019 results are not normalized to reflect the number of passengers or passenger miles compared to fuel consumption, so they do not provide any context regarding operational service changes between the inventory years (e.g., service expansion).
- VTA Bus/Shuttle
  - Available base year data represents calendar year 2010, not 2005
  - No VMT data was available for calendar year 2010, so 2019 VMT/gallons of fuel consumed factor was applied to 2010 gallons of fuel consumed to approximate 2010 VMT value to calculate CH_4 and N_2O emissions (negligible impact)

2030 Emissions Forecasts

- SJRRC emissions forecasts were estimated from 2019 through 2030 based on recent system service planning efforts. The result is an estimated increase of approximately 301% in GHG emissions from 2005 to 2030.
- For this analysis, the estimated change in annual rail service miles from 2019 to the 2030 planning scenario served as a proxy for changes in locomotive fuel use demand.

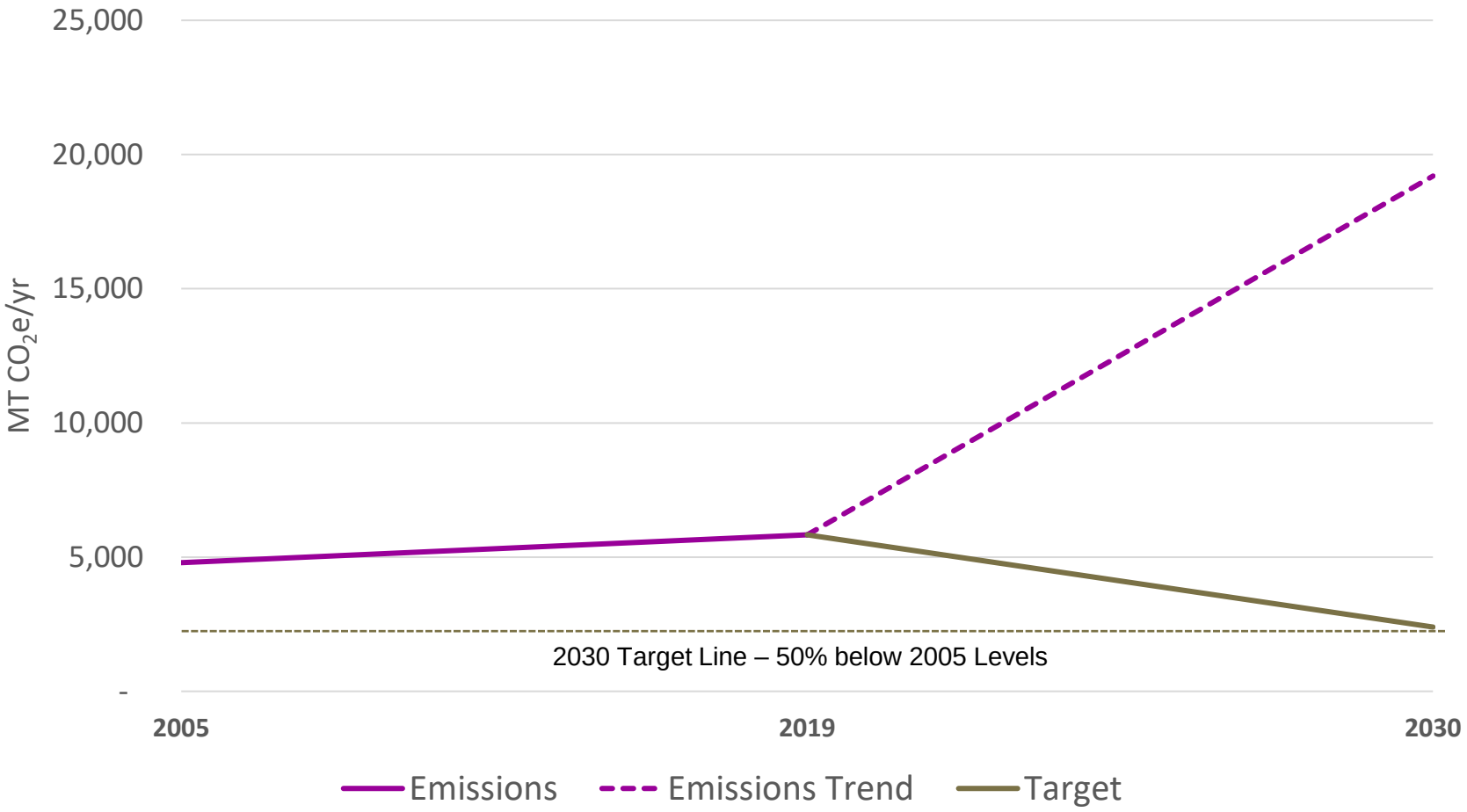
2030 Emissions Forecasts

- The greatest contributing factor to estimated future emissions growth is from the anticipated expansion of ACE Rail service. By 2030, ACE will begin operating several new extensions that will substantially increase the geographical scope of the service, particularly in the San Joaquin Valley:
  - **Lathrop to Ceres / Merced Extension**: A new southern branch from the Lathrop Wye extending to Modesto and Merced, where trains will connect with high-speed rail (HSR).
  - **Sacramento Extension**: A new northern extension from Stockton to Midtown Sacramento and Natomas.
  - **Union City Extension**: A new Bay Area branch to connect with the future East Bay Rail Hub at BART's Union City station.

2030 Emissions Forecasts

- Long-range planning for SJRRC bus/shuttle services has not yet been completed. For analysis purposes, the CAP Framework assumed that bus/shuttle service would experience some increase due to the increase in the number of trains operating within each service area.
  - LAVTA bus/shuttle service was assumed to increase by 50% as train service at Pleasanton is expected to increase from 4 roundtrips to 8 roundtrips, with the further assumption that not every new train trip will receive a new bus trip.
  - VTA bus/shuttle service was assumed to increase by 25% as train service at Great America is expected to increase from 4 roundtrips to 5 roundtrips, with the further assumption that no buses will be provided for the new Union City trains.
- SJRRC is committed to working with LAVTA to transition to 100% renewable diesel in its bus and shuttle fleets in the near-term and convert to zero-emissions vehicles over the medium-term. The agency is also committed to working with VTA to transition its fleet of LPG shuttles to zero-emissions vehicles over the medium-term. These strategies would result in near-zero GHG emissions from fleet fuel use, regardless of how SJJRC bus/shuttle services change through 2030 in response to the expansion of train services.

GHG Emissions Forecasts & Target



Inventory Comparison & 2030 Target

- The agency's 2030 GHG target is 2,396 MT CO_2e/yr (i.e., 50% below 2005 base year emissions levels).
- Based on the estimated emissions forecast, target achievement will require GHG reductions totaling 16,808 MT CO_2e/yr in 2030.

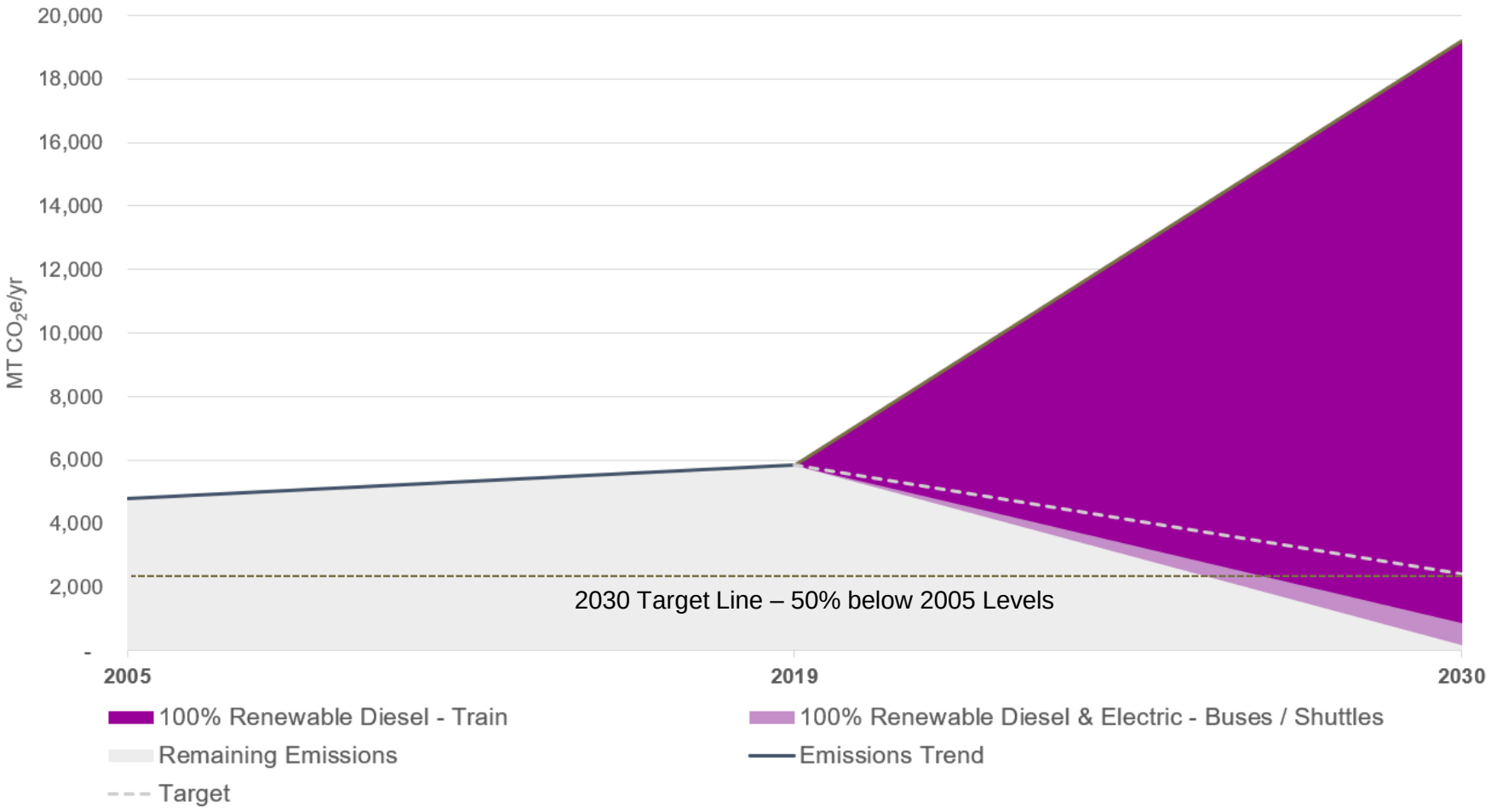
Emissions Source	2005 MT CO_2e/yr	2019 MT CO_2e/yr	2030 MT CO_2e/yr
Locomotives	4,388	5,297	18,500
Buses / Shuttles	403	538	704
Total	**4,791**	**5,835**	**19,204**
2030 Target	50% below 2005 levels = **2,396 MT CO_2e/yr**		
2030 Reductions Needed	**16,808 MT CO_2e/yr**		

GHG Reduction Pathway

GHG Reduction Actions

- SJRRC is committed to using 100% renewable diesel in its trains by 2023, and renewable diesel or zero-emissions technology in its buses/shuttles by 2026. This renewable fuel use commitment will bring the agency's operational emissions analyzed in this initial CAP Framework to near-zero by 2030.
- VTA operates shuttles on behalf of SJRRC, which are fueled by LPG and cannot use renewable diesel as an alternative. However, VTA is committed to replacing its LPG fleet with electric shuttles prior to the 2030 CAP target year, which will help to further reduce SJRRC's operational GHG emissions.
- After implementing the actions above, the agency's remaining emissions would total 168 MT CO_2e/yr in 2030, which represents the methane (CH_4) and nitrous oxide (N_2O) emissions associated with renewable diesel use; the carbon component of this fuel is biogenic in nature because the fuel is derived from biomass materials that naturally sequester carbon. For GHG inventory purposes, biogenic carbon emissions should be reported separately, but are not included in the GHG emissions total.

2030 Target Achievement Pathway



2030 Target Achievement

Emissions Source	2005 MT CO_2e/yr	2019 MT CO_2e/yr	2030 MT CO_2e/yr
Locomotives	4,388	5,297	18,500
Buses / Shuttles	403	538	704
Total	**4,791**	**5,835**	**19,204**
2030 Target	50% below 2005 levels = **2,396 MT CO_2e/yr**		
100% Renewable Diesel - Trains	-	-	-18,336
100% Renewable Diesel & Electric – Buses/Shuttles	-	-	-700
Sub-total	**-**	**-**	**-19,036**
Remaining Emission	-	-	168
% below 2050 Levels	**-**	**-**	**96.5%**

Future GHG Reduction Actions

- In 2020, Governor Newsom signed Executive Order N-79-20 that calls for decarbonization within the transportation industry, including a target of 100% zero-emission off-road vehicles by 2035.
- To achieve the goals of this Executive Order, SJRRC will take a phased approach to decarbonizing its transit services. This includes the initial commitment to transition fuel use to renewable diesel, followed by a transition to a zero-emissions train and bus/shuttle fleet.

Future GHG Reduction Actions

- As recently as the last Transit and Intercity Rail Capital Program (TIRCP) cycle, SJRRC applied for funding for research and development and pilot testing of new vehicle technologies that will help achieve the state's GHG reduction targets.
- The agency is considering a wide range of technology options for achieving zero emissions, including more visionary solutions such as a transition to zero-emissions multiple-unit (ZEMU) trains. In partnership with the State, SJRRC will work toward transitioning to a full zero-emissions fleet by 2035.

Other Sustainability Actions

- The agency also has a history of taking action that will improve general sustainability outcomes, some of which fall outside a CAP's traditional GHG focus, and/or fall outside the scope of this initial CAP Framework, including:
  - Incorporating Tier 4 locomotives into the fleet:
    - These provide a minor increase in GHG emissions but substantial improvement to air quality emissions.
    - These locomotives also allow an increase in coaches per train (from 7 to 10), which improves per passenger fuel efficiency metrics.
  - Constructing a LEED-certified regional maintenance facility in Stockton
    - Constructed in 2014, it is a state-of-the-art facility incorporating wayside power, on-site solar from 1,100 solar photovoltaic panels that provide 20% of the building's power, a 102,000-gallon rain harvest tank, daylight harvesting to reduce electric lighting, and other sustainability features.
  - In the process of developing on-site solar programs at stations, with an initial focus on new station construction projects. This reduces operational energy demand that might otherwise be provided from non-renewable sources.
  - Planning for service expansions, which helps avoid GHG emissions throughout the state by facilitating a switch toward low-carbon travel options.

Stakeholder Engagement

Stakeholder Engagement

- Following development of this initial CAP Framework, the agency's steps for stakeholder engagement are to consider working with groups like the Central Valley Working Group and Valley Directors Committee, and then take the draft CAP Framework to the Rail Commission for approval.
- Following approval, the agency will publish the CAP Framework to its website.

Monitoring Approach

GHG Reduction Monitoring

- The agency will approach GHG target progress monitoring in two ways, including tracking overall GHG reductions and tracking individual action implementation.
- **Top-down monitoring** – The agency will regularly track fuel use (and fuel type) for its trains and buses/shuttles, along with other transit service metrics that help contextualize fuel consumption, such as:
  - Gallons of fuel use by each service compared to annual service miles provided to express changes in operational efficiency
- **Bottom-up monitoring** – The agency will also track implementation of specific GHG reduction actions to monitor their individual progress over time. This more granular level of monitoring will support course corrections, as needed, if specific actions are not achieving their estimated potential.
  - For example, as part of bottom-up monitoring the agency can confirm continued use of renewable diesel in locomotives and buses/shuttles as planned, until zero-emissions vehicles are fully incorporated.
  - Similarly, when the agency expands the GHG inventory to include stationary energy use (for example) and develops new GHG reduction actions, implementation of those actions can be monitored on a regular timeline to confirm progress occurs as estimated.

Anticipated Future Steps in Climate Action Planning

Note: opportunities presented in this section are contingent upon the agency identifying additional funding sources to complete further GHG analysis.

GHG Inventory Expansion

- As described earlier, this CAP Framework is based on a partial GHG inventory that considers the agency's largest operational emissions sources. Future phases of CAP analysis can expand that scope to consider a fuller range of operational emissions sources, as guided by the GHG inventory protocols referenced in this CAP Framework. The following slide suggests a potential phased approach to expanding GHG emissions analysis based on the likely scale of additional emissions sources and data availability.

GHG Inventory Expansion

- The agency can include additional emissions sources based on Corporate Standard requirements, as prioritized below:
  - Priority #1
    - Purchased electricity for total agency operations
    - Stationary combustion – natural gas, propane, diesel, etc.
  - Priority #2
    - Mobile combustion – fuel use in other agency on-road vehicles
    - Mobile combustion – fuel use in agency off-road vehicles & equipment
  - Priority #3
    - Fugitive sources – refrigerant use
    - Fugitive sources – natural gas distribution leaks
    - Optional ‘other sources’ as deemed relevant by the agency

GHG Inventory Expansion

- As part of future GHG emissions analysis, the agency can also determine its ability to report ‘optional’ emissions sources, such as:
  - Employee commute
  - Employee business travel
  - Waste disposal

New Action Identification

- As additional emissions sources are included in the agency's operational GHG inventory, new actions can be developed, implemented, and monitored to reduce those corresponding emissions. Additional GHG reduction opportunities could include:
  - Decarbonizing buildings/facilities to transition away from fossil fuel appliances/equipment
  - Renewable energy generation/purchases
  - Decarbonizing agency on-road fleet (e.g., passenger vehicles, light-duty trucks) and construction equipment/off-road vehicles

Avoided Emissions Analysis

- SJRRC plays an important role in decarbonizing travel in California. Beyond reducing operational GHG emissions, the agency's core service is a primary GHG reduction strategy for long-term State and national GHG goals. Agency service expansion helps to remove vehicles from roadways (and, in the future, passengers from airplanes) and replaces them with a zero-carbon transit alternative. As the agency achieves its goals for a zero-emissions fleet, its future service expansion is a net positive solution to global climate change.
- The most significant GHG reductions resulting from the agency's low- (and soon-to-be zero) carbon transit service likely accrue outside of this CAP Framework. These are the GHG reductions from avoided emissions – on-road community transportation emissions that can be avoided through use of SJRRC trains and buses/shuttles. Within a CAP perspective, these emissions reductions would appear in the various community CAPs for jurisdictions served by SJRRC.

Avoided Emissions Analysis

- The agency has begun estimating the avoided GHG emissions as part of its most recent TIRCP application. Future expansion of this CAP Framework can refine these initial estimates and put them in the context of the agency's operational GHG emissions.
- Future CAP efforts might also include quantified estimates for reductions in air pollutants, beyond GHG emissions, to contextualize other public health benefits of the agency's decarbonization actions, including benefits to environmental justice communities.

Long-term GHG Target

- The agency can set a long-term GHG reduction target beyond the initial 2030 target analyzed in this CAP Framework.
- Based on trends in climate planning from industry leaders, public agencies, local governments and others, an appropriate long-term target could be set as zero carbon or carbon neutrality by some future target year (e.g., 2045, 2050).
- The process for establishing a long-term target should consider all emissions sources within the complete GHG inventory and corresponding reduction strategies.