3.6 Energy

3.6.1 Introduction

This section describes the regulatory and environmental setting for energy resources and energy use in the vicinity of the Proposed Project [including all track variants, technology variants, and the Greenville and Mountain House initial operating segments (IOS)] and the alternatives analyzed at an equal level of detail (Southfront Road Station Alternative, Stone Cut Alignment Alternative, West Tracy Operation and Maintenance Facility [OMF] Alternative, Mountain House Station Alternative, and Downtown Tracy Station Parking Alternatives 1 and 2).

This section also describes the impacts on energy resources and mitigation measures that would reduce significant impacts where feasible and appropriate for the Proposed Project and the alternatives analyzed at an equal level of detail. Additional consideration of energy-related impacts are presented in Section 3.3, *Air Quality*, which discusses the implications of energy use on air quality; Section 3.8, *Greenhouse Gas Emissions*, which calculates potential greenhouse gas (GHG) emissions from energy use; and Section 3.18, *Utilities and Service Systems*, which describes potential interruption of electricity and natural gas service. Cumulative impacts on energy resources, in combination with planned, approved, and reasonably foreseeable projects, are discussed in Chapter 4, *Other CEQA-Required Analysis.*

In addition, this section describes the construction and operational energy impacts of the Proposed Project and the alternatives analyzed at an equal level of detail. For construction, energy impacts are analyzed for the Proposed Project and the alternatives analyzed at an equal level of detail. For operations, energy impacts are analyzed as follows.

- The Proposed Project including the four technology variants: diesel multiple unit (DMU), hybrid multiple unit (HBMU), battery-electric multiple unit (BEMU) and diesel locomotive haul (DLH).
- The Proposed Project with the potential use of renewable diesel.
- The Stone Cut Alignment Alternative.
- The Southfront Road Station Alternative.

The Mountain House Station Alternative and the Downtown Tracy Station Parking Alternatives would have the same level of train service and ridership as the Proposed Project, so their operational energy impacts would be the same as the Proposed Project; these alternatives were not analyzed separately for operational impacts. The West Tracy OMF Alternative would have the same operational energy impacts as the proposed Tracy OMF and this alternative was not analyzed separately for operational impacts.

3.6.2 Regulatory Setting

This section summarizes federal, state, regional, and local regulations related to energy resources and energy use and applicable to the Proposed Project, as well as the alternatives analyzed at an equal level of detail.

3.6.2.1 Federal

Energy Policy Act of 1992

The Energy Policy Act of 1992 consists of 27 titles detailing the various measures designed to lessen the nation's dependence on imported energy, provide incentives for clean and renewable energy, and promote energy conservation in buildings. Title III of Act addresses alternative fuels. It gave the U.S. Department of Energy administrative power to regulate the minimum number of light-duty alternative fuel vehicles required in certain federal fleets beginning in fiscal year 1993. The primary goal of this program is to cut petroleum use in the U.S. by 2.5 billion gallons per year by 2020.

Energy Policy Act of 2005

The Energy Policy Act of 2005, which was intended to establish a comprehensive, long-term energy policy, is implemented by the U.S. Department of Energy. The Act addresses energy production in the U.S., including oil, gas, coal, and alternative forms of energy, as well as energy efficiency and tax incentives. Energy efficiency and tax incentive programs include credits for the construction of new energy efficient houses, production or purchase of energy efficient appliances, and loan guarantees for entities that develop or use innovative technologies that avoid the production of GHGs. To reduce national energy consumption, the Act also directed the National Highway Traffic Safety Administration (NHTSA) within the U.S. Department of Transportation to establish the Corporate Average Fuel Economy (CAFE) Program. Under the CAFE Program, NHTSA prescribes and enforces average fuel economy standards for passenger cars and light trucks sold in the U.S.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 was intended to increase U.S. energy security, develop renewable fuel production, and improve vehicle fuel economy. The Energy Independence and Security Act of 2007 amended the Energy Policy Act of 2005 to introduce more aggressive requirements. The Act's three key provisions strengthened the CAFE Standards, the federal Renewable Fuel Standard, and the federal energy efficiency standards for appliances and lighting.

On August 2, 2018, the U.S. Department of Transportation and the U.S. Environmental Protection Agency (USEPA) proposed the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule. The SAFE Vehicles Rule would amend the existing NHTSA CAFE standards and the existing USEPA tailpipe carbon dioxide emissions standards for passenger cars and light trucks and establish new standards covering model years 2021 through 2026. The proposed rule would retain the model year 2020 standards for both programs through model year 2026. Under the framework, the auto companies' party to the voluntary agreement would only sell cars in the U.S. that meet these levels.

3.6.2.2 State

Assembly Bill 2076, Reducing Dependence on Petroleum

The California Energy Commission (CEC) and the California Air Resources Board (CARB) are directed by Assembly Bill (AB) 2076 (passed in 2000) to develop and adopt recommendations for reducing dependence on petroleum. AB 2076 has a performance-based goal to reduce petroleum demand to 15 percent less than 2003 demand by 2020.

Assembly Bill 1493, Pavley Rules/Advanced Clean Cars

Known as "Pavley I," AB 1493 outlined the nation's first GHG standards for automobiles. Additional strengthening of the Pavley standards (referred to previously as "Pavley II," and now referred to as the "Advanced Clean Cars" measure) has been proposed for vehicle model years 2017–2020. Together, the two standards are expected to increase average fuel economy to roughly 43 miles per gallon by 2020. The USEPA and CARB have also adopted joint rulemaking to establish GHG emissions standards for 2017–2025 model year passenger vehicles.

Senate Bills 1078, 107, and 2—Renewables Portfolio Standard

Senate Bills (SBs) 1078 (2002), 107 (2006) and 2 (2011), California's Renewables Portfolio Standard (RPS), obligates investor-owned utilities, energy service providers, and Community Choice Aggregators to procure additional retail sales per year from eligible renewable sources with the long-range target of procuring 33 percent of retail sales from renewable resources by 2020. The California Public Utilities Commission (CPUC) and the CEC are jointly responsible for implementing the program.

Senate Bills 350 and 100—De Leon (Clean Energy and Pollution Reduction Act of 2015, 100 Percent Clean Energy Act of 2017)

SB 350 was approved by the California legislature in September 2015 and signed by Governor Brown in October 2015. Its key provisions are to require the following by 2030: (1) an RPS of 50 percent and (2) a doubling of energy efficiency (electrical and natural gas) by 2030, including improvements to the efficiency of existing buildings. These mandates will be implemented by future actions of CPUC and CEC. SB 100 was approved by the California legislature in August 2018 and signed by Governor Brown in September 2018. Its key provisions include updating the SB 350 RPS requirement from 50 to 60 percent by 2030 and creating the policy of planning to meet all the state's retail electricity supply with a mix of RPS-eligible and zero-carbon resources by December 31, 2045, for a total of 100 percent clean energy.

California Code of Regulations Title 20 and Title 24, Part 6

New buildings constructed in California must comply with the standards contained in California Code of Regulations (Cal. Code Regs.) Title 20, Energy Building Regulations, and Title 24, Energy Conservation Standards. Cal. Code Regs. Title 20 standards range from power plant procedures and siting to energy efficiency standards for appliances, ensuring reliable energy sources are provided and diversified through energy efficiency and renewable energy resources. Cal. Code Regs. Title 24 requires the design of building shells and building components to conserve energy. The Energy Conservation Standards for new residential and nonresidential buildings were adopted by the California Energy Resources Conservation and Development Commission in June 1977 and were most recently revised in 2016 (per Cal. Code Regs. Title 24, Part 6). These standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods.

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (i.e., Cal. Code Regs. Title 24, Part 11) was adopted as part of the California Building Standards Code. The code was last updated in 2016. Cal. Code Regs. Part 11 establishes mandatory standards, including planning and designing for sustainable site development, energy efficiency (i.e., more than the California Energy Code requirements), water efficiency and conservation, material conservation and resource efficiency, and environmental quality. The 2019 standards improved upon the 2016 standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The 2019 standards went into effect on January 1, 2020.

California Energy Code

California's energy efficiency standards for residential and nonresidential buildings are described in Cal. Code Regs. Title 24, Part 6. These standards were established in 1978 in response to a legislative mandate to reduce California's energy consumption and have been updated periodically to include new energy efficiency technologies and methods. The California Energy Code requires compliance with energy efficiency standards for all new construction, including new buildings, additions, alterations, and, in nonresidential buildings, repairs.

California Energy Action Plan

The CEC is responsible for preparing the *State Energy Action Plan* (CPUC 2008), which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The *State Energy Action Plan* calls for the State to assist in the transformation of its transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the fewest environmental and energy costs. First-priority actions to address California's increasing energy demands are energy efficiency and demand response (i.e., reduction of customer electricity usage during peak periods to address system reliability and support the best use of energy infrastructure). Additional priorities include the use of renewable sources of power and distributed generation (i.e., the use of relatively small power plants near or at centers of high demand). To further this policy, the *State Energy Action Plan* identifies several strategies, including aiding public agencies and fleet operators.

3.6.2.3 Regional and Local

Appendix I, *Regional Plans and Local General Plans*, lists applicable goals, policies, and objectives from regional and local plans in the Proposed Project's jurisdiction. Section 15125(d) of the CEQA Guidelines requires an EIR to discuss "any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans." These plans were considered during preparation of this analysis and were reviewed to assess whether the Proposed Project would be consistent[1] with the plans of relevant jurisdictions. The Proposed Project, as well as the alternatives analyzed at an equal level of detail, would be generally consistent with the applicable goals, policies, and objectives related to energy use and conservation identified in Appendix I.

3.6.3 Environmental Setting

This section describes the Proposed Project's environmental setting related to energy resources and energy use. The study area for energy relevant to the Proposed Project includes the entire service areas of the energy providers that would serve the Proposed Project during construction and operation.

[1] An inconsistency with regional or local plans is not necessarily considered a significant impact under CEQA unless it is related to a physical impact on the environment that is significant.

3.6.3.1 Overview of Energy Consumption in the State

Overall, California's energy consumption (per capita) and production are among the lowest and highest, respectively, in the nation. Because of its mild climate and energy efficiency programs, California ranked 48th in the nation for per capita energy consumption in 2016 (the most recent year for which data are available). In 2017, California ranked second in the nation in conventional hydroelectric generation, and first in net electricity generation from other renewable energy resources. As of January 2018, California ranked third in the nation in petroleum refining capacity (U.S. Energy Information Administration 2018).

The transportation end-use sector consumes the largest share of energy in California. In 2017, transportation accounted for 40.3 percent of all energy consumed in California, compared to 23.1 percent for industrial uses, 18.7 percent for commercial uses, and 18.0 percent for residential uses (U.S. Energy Information Administration 2018).

Table 3.6-1 compares various modes of passenger travel within the U.S. and the approximate energy use for each mode. Rail transit energy use per passenger-mile was less than for cars, personal trucks, and transit buses in 2016. In other words, rail transit is more energy efficient per passenger-mile than other common transportation modes.

Table 3.6-1. 2016 U.S. Passenger Travel Mode and Energy Use

Travel Mode	Vehicle-miles (millions)	Passenger-miles (millions)	Energy Usage (Btu per vehicle-mile)	Energy Usage (Btu per passenger-mile)
Cars	1,453,356	2,238,169	4,526	2,939
Personal Trucks	1,167,371	2,124,615	6,255	3,437
Motorcycles	20,455	23,728	2,847	2,454
Aircraft[a]	5,589	632,648	263,971	2,332
Buses (Transit)	2,255	20,565	37,404	4,102
Rail (Transit)	810	20,923	19,654	761
Rail (Commuter)	372	11,768	53,709	1,696
Rail (Intercity-Amtrak)	316	6,520	31,958	1,551

Source: Oak Ridge National Laboratory 2017, 2019
[a] Data for 2015 used because information for 2016 was unavailable.
Btu = British thermal unit

3.6.3.2 Petroleum, Electricity, and Natural Gas

Among the various types of energy sources, petroleum (i.e., diesel fuel) is the primary fuel consumed in terms of construction and operational energy demand and would be used to propel trains on their scheduled runs. Of the other primary energy sources, electricity would be used principally for operation of the stations and the OMF. Natural gas would be used only by the OMF. These energy sources and their providers are described in the following sections.

Petroleum

California's crude oil production has declined overall in the past 30 years; however, it remains one of the top producers of crude oil in the nation, accounting for almost 5 percent of total U.S. production in 2019 (U.S. Energy Information Administration 2019a). California ranks third in the nation in petroleum refining capacity and accounts for more than one-tenth of the total U.S. capacity (U.S. Energy Information Administration 2019b).

California imported approximately 369 million barrels of crude oil from foreign countries in 2018 and obtained approximately 73 million barrels of crude oil from Alaska (California Energy Commission 2019a). The CEC reported in-state crude oil production and domestic crude oil imports of approximately 200 million barrels for 2018; this value includes both crude oil produced in California and crude oil transported to California from the other lower 48 states including North Dakota and the Gulf Coast states. Overall petroleum supplied in 2018 in California was therefore approximately 642 million barrels of crude oil (California Energy Commission 2019a).

Almost 40 percent of California's energy consumption results from the transport of goods and people. In 2018 sales of diesel fuel to California end users was approximately 1,187,100 gallons per day (gpd) and sales of gasoline to California end users was approximately 455,900 gpd, or approximately 2.1 billion gallons per year (U.S. Energy Information Administration 2019c, 2019d).

Valley Pacific Petroleum will provide diesel fuel for the operation of Valley Link trains. Valley Pacific Petroleum obtains its fuel from the Chevron Richmond Refinery, a 2,900-acre petroleum refinery in Richmond, California, which processes about 250,000 barrels of crude oil a day (Chevron 2018).

Electricity

California's electricity use is assessed annually by the California Independent System Operator (CAISO) and the CPUC CAISO is a not-for-profit corporation in charge of operating the long-distance, high-voltage power lines that deliver electricity, and CPUC publishes the *Long-Term Procurement Plan*, which aims to implement a safe, reliable, and cost-effective electricity supply in California. CAISO works with state agencies, generation and transmission owners, load serving entities, and other balancing authorities to identify any issues regarding upcoming operating conditions. Significant amounts of new renewable generation have reached commercial operation, and this trend is expected to continue as new renewable generation comes online to meet the State's RPS.

According to the CEC, total statewide electricity consumption grew from 228,970 million kilowatt hours (kWh) in 1990 to 281,120 million kilowatt hours in 2018 (California Energy Commission 2019b). Alameda and San Joaquin Counties represented 4 and 2 percent of total statewide consumption, respectively, in 2018 (i.e., 10,344 million kWh in Alameda and 5,629 million kWh in San Joaquin County).

Electricity in Alameda and San Joaquin Counties is supplied by Pacific Gas and Electric Company (PG&E). PG&E provides electricity for approximately 5.2 million customer accounts in a 70,000-square-mile service area in northern and central California. PG&E's service area stretches from Eureka in the north to Bakersfield in the south, and from the Pacific Ocean in the west to the Sierra Nevada in the east. As of December 2018, PG&E operates 18,000 circuit miles of interconnected transmission and distribution lines (Pacific Gas and Electric Company 2019).

In 2018, PG&E generated and procured 48,832 gigawatt-hours (gWh) of electricity (Pacific Gas and Electric Company 2019). The *California Energy Demand Revised Forecast 2018–2030*, which describes electricity consumption, sales, and peak demand, reports that peak demand within the PG&E service area reached almost 21,000 megawatts the same year (California Energy Commission 2018). Peak demand is the amount of electricity consumed at any given moment, usually integrated over a 1-hour period. Peak demand is important in evaluating system reliability, identifying congestion points on the electrical grid, and designing required system upgrades. Peak demand has grown by steadily since 1990. The increase in peak electricity demand represents overall growth since 1990; however, peak demand fluctuates in the short term as a result of many factors, including the economy (California Energy Commission 2018).

PG&E's generation portfolio includes hydroelectric facilities, a nuclear power plant, photovoltaics, fuel cells, and fossil fuel-fired stations. The net operating capacity of these facilities at the end of 2018 was 7,686 megawatts (Pacific Gas and Electric Company 2019). Table 3.6-2 summarizes PG&E's 2017 mix of energy sources (Pacific Gas and Electric Company 2018a).

Table 3.6-2. 2017 Pacific Gas and Electric Company Power Portfolio

Source	Percent of Mix[a]
Renewable	33
Nuclear	27
Natural gas and other fossil-fuels	20
Large hydroelectric	18
Market purchases	2
Total	100

Source: Pacific Gas and Electric Company 2018a.
[a] PG&E-owned generation and power purchases.

Natural Gas

PG&E supplies the natural gas service in Alameda and San Joaquin Counties and is responsible for maintaining the infrastructure for natural gas distribution and transmission. PG&E's natural gas system spans 70,000 square miles, serves approximately 6 million gas customers, and delivers 970 billion cubic feet of gas per year, or 2.6 billion cubic feet per day. PG&E's gas transmission and distribution pipelines stretch from Eureka in the north to Bakersfield in the south and from the Pacific Ocean in the west to the Sierra Nevada in the east. PG&E has more than 6,700 miles of gas transportation pipeline and 42,000 miles of gas distribution pipeline. PG&E's network of high-pressure natural gas transmission pipelines generally follows existing transportation corridors, such as roads and railroad tracks (Pacific Gas and Electric Company 2018b).

3.6.4 Impact Analysis

This section describes the environmental impacts of the Proposed Project and the alternatives analyzed at an equal level of detail on energy resources. It describes the methods used to evaluate the impacts and the thresholds used to determine whether an impact would be significant. Measures to mitigate significant impacts are provided, where appropriate.

3.6.4.1 Methods for Analysis

Energy impacts were analyzed by assessing energy usage associated with construction and operation of the Proposed Project and the alternatives analyzed at an equal level of detail. Energy usage was assessed and quantified using standard and accepted energy intensity factors.

Construction

Construction would require gasoline and diesel fuel as the primary sources of energy, for construction equipment, trucks, and employee vehicles. Energy consumption associated with construction would be temporary and would cease when construction activities are complete. Construction-period energy demand was estimated by applying energy factors from Oak Ridge National Laboratory (2015) to the anticipated construction equipment and vehicle activity.

Operations

The analysis of energy demand associated with operation of the Proposed Project considers the following components.

- Train operation and idling—the Proposed Project would result in consumption of diesel fuel for train operations.
- Station and maintenance facility operations—new stations and an OMF would be established, resulting in new electricity demand at these facilities.
- Automobile fuel consumption—the OMF would result in fuel consumption via train operation, maintenance, and administrative staff.
- Natural gas consumption—OMF buildings would also use natural gas, resulting in new gas demand.
- Displaced passenger vehicle miles—the shift of travelers from automobiles to passenger rail transit would result in reduced automobile vehicle-miles traveled (VMT) and thus reductions in automobile fuel consumption.

The energy usage for each component is calculated based on its respective energy intensity factor, which expresses the amount of energy used per unit of activity (e.g., per hour or per VMT). For comparison purposes and to derive the net operational energy consumption, the energy usage for each component is converted into British thermal units (Btu). The methodology for deriving the operational energy demand for each of these components is summarized below.

Train Operation

The new Valley Link rail service would result in diesel fuel consumption from train operations, including travel over the route and idling while loading passengers at stations. Route mileage for the single track and double track variants would be the same.

The impact analysis considers three train technology variants as discussed in Section 2.3.6: DMU, HBMU, and BEMU. For DMU travel, a diesel fuel consumption rate of 1.81 gallons per mile per three-car trainset was used for analysis (Bombardier 2018). For DMUs idling at stations, a rate of 6.5 gallons per hour per three-car trainset was used for analysis based on Frey and Hu (2015). The HBMU uses diesel-battery hybrid technology, which allows more efficient operation of a diesel engine and allows for energy recovery through regenerative braking. Consequently, diesel fuel consumption with HBMUs is expected to be less than that of DMUs. HBMU fuel consumption is estimated to be 11.38 percent less than DMU fuel consumption (Lo pers. comm.). BEMU trains are electrically powered by batteries only and do not consume fuel directly. However, electricity would be used to recharge trains' batteries, and generating the electricity would require energy. This energy would be supplied by PG&E and could be generated by combustion of fossil or other fuels or from renewable resources such as hydroelectric, wind, and solar. BEMU electric energy use was not quantified for this analysis because data about the amount of energy trains would use and about battery charging efficiency were not available. However, because the energy intensity of electricity generation is less than for diesel engines, any fuel consumed to generate electricity for charging BEMUs is expected to be less than fuel consumed by DMUs or HBMUs.

Diesel fuel produced from renewable resources is an option for fueling DMUs and HBMUs. The use of renewable diesel fuel reduces emissions of certain criteria pollutants and GHGs (Section 3.3) but increases fuel consumption. Use of renewable diesel fuel by DMUs and HBMUs would increase their fuel consumption by 4 percent (Lo pers. comm.).

Station and OMF Operation

Stations would be constructed along the alignment and an OMF would be constructed to support train operation and maintenance associated with the new rail service. Station operation would result in new electricity consumption for lighting at surface parking lots and station platforms, and to operate passenger elevators. Electrical demand at stations was calculated based on the estimated configuration of lighting and elevators. Staff commuting to and from the OMF would consume automobile fuel. OMF buildings would use electricity for lighting and train maintenance and repair and would use natural gas for heating. Energy use for the OMF was calculated using the California Emissions Estimator Model (CalEEMod).

Displaced Passenger Vehicle Miles

Operation of the Proposed Project would introduce new passenger rail service that would encourage travelers and commuters to divert from personal vehicles to passenger rail, which would reduce automobile use and traffic volume on the region's roadways, and would in turn would reduce vehicle fuel usage. A displaced VMT analysis was used to derive changes in energy demand by shifting from use of personal vehicles. Reduced personal VMT due to this modal shift was quantified for the following scenarios.

- 2025 IOS
- 2025 Full Operation of the Proposed Project[2]
- 2040 Full Operation Proposed Project

The 2025 IOS phase assumes an initial operating segment that would include service only between the Dublin/Pleasanton Station and the Greenville or Mountain House Stations.

Fuel consumption rates for motor vehicles were estimated using the California Department of Transportation (Caltrans) CT-EMFAC2017 model. CT-EMFAC calculates air pollutant emissions and fuel consumption for a population of vehicles considering the distributions of vehicle types and ages,

[2] Full operation refers to operating Valley Link from the Dublin/Pleasanton Station to North Lathrop Station.

the distribution of VMT accrual by vehicle speed, other vehicle characteristics, and regional meteorology.

3.6.4.2 Thresholds of Significance

According to Appendix F of the CEQA Guidelines, conserving energy may be achieved by decreasing overall per capita energy consumption; by decreasing reliance on fossil fuels such as coal, natural gas, and oil; and by increasing reliance on renewable energy sources. Appendix G of the CEQA Guidelines identifies significance criteria to be considered for determining whether a project could have significant impacts on energy conservation. Under these criteria, an energy impact would be considered significant if construction or operation of the Proposed Project would have either of the following consequences.

- Potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy, or wasteful use of energy resources, during project construction or operation.
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

3.6.4.3 Impacts and Mitigation Measures

Impact EN-1: Construction, operation, and maintenance of the Proposed Project could result in wasteful, inefficient, and unnecessary consumption of energy.

Level of Impact	**Less than significant (beneficial)**
Mitigation Measures	**None required**

Impact Characterization

During construction, energy in the form of gasoline and diesel fuel would be used to operate construction equipment and vehicles. Energy consumption associated with construction activities would be temporary and would cease when construction is complete.

Operation of the Proposed Project would involve train service, station operation, and OMF operation, all of which would result in increased energy usage. Of the potential train technologies, DMUs would use the most energy, followed by HBMUs, and BEMUs, which would use the least energy. However, the Valley Link service, by providing an alternative to driving, would encourage travelers and commuters to divert from personal vehicles to passenger rail. For operation of the Proposed Project under the 2025 IOS, the resulting reduction in VMT and the related decrease in vehicle fuel consumption would not be enough to offset the operational Proposed Project's energy demands, resulting in a slight net increase in energy usage relative to no project conditions. For full Proposed Project operation in 2025 and 2040, the resulting reduction in VMT and the related decrease in vehicle fuel consumption would offset operational energy demands, resulting in a net energy savings relative to no project conditions.

Impact Detail and Conclusions

Proposed Project

Construction

Construction impacts are defined as impacts resulting from building the Proposed Project facilities (e.g., new and upgraded track, bridge crossing structures, at-grade crossing modifications, new stations, and new maintenance facility), associated infrastructure, and related physical changes. During construction, energy in the form of gasoline and diesel fuel would be used to produce and transport construction materials, operate construction equipment and trucks, and for worker commuting. Natural gas is not typically used during construction and none of the construction equipment likely to be used would require electricity. Energy consumption associated with construction activities would be temporary and would cease when construction is complete. Table 3.6-3 summarizes the estimated consumption of diesel fuel and gasoline associated with construction of the Proposed Project and with the alternatives analyzed at an equal level of detail.

Furthermore, as discussed in Section 3.3, required construction air quality emissions mitigation will further reduce energy use through implementation of Mitigation Measure AQ-2.1, which would require the use of advanced emissions controls for off-road equipment; through Mitigation Measure AQ-2.2, which would minimize idling times and ensure all construction equipment is maintained properly; through Mitigation Measure AQ-2.3, which would require advanced emissions controls for diesel trains; and through Mitigation Measure AQ-2.4, which would ensure the use of a modern fleet for material delivery and haul trucks, would be required during the construction. These mitigation measures require the use of newer construction equipment, trains, and on-road vehicles that are generally more fuel efficient than older construction equipment, trains, and on-road vehicles. These mitigation measures are required to address construction air quality impacts; they are not required to address construction energy use as the Proposed Project will reduce energy use overall (when combining construction and operational energy use).

Table 3.6-3. Estimated Fuel Consumption During Project Construction

Segment and Facility	Fuel Usage[a] (gallons) 2022	2023	2024	2037	2038	Total	Total Energy (MMBtu)
Proposed Project							
Tri-Valley Segment							
Tri-Valley Alignment	301,742	229,234	3,650	N/A	N/A	534,626	73,447
Dublin/Pleasanton Station	0	64,169	32,226	N/A	N/A	96,395	13,243
Isabel Station	0	48,126	24,170	41,331	20,317	133,944	18,401
Greenville Station	0	64,169	32,226	11,633	N/A	108,028	14,841
Altamont Segment							
Altamont Alignment, Double Track	614,423	312,396	0	N/A	N/A	926,819	127,327
Mountain House Station	0	44,209	22,333	11,633	N/A	78,175	10,740
Interim OMF	84,971	63,421	43,398	N/A	N/A	191,790	26,348
Tracy OMF	334,762	143,818	90,307	N/A	N/A	568,887	78,154
Tracy to Lathrop Segment							
Tracy to Lathrop Alignment (Dbl Track)	625,123	474,389	7,491	N/A	N/A	1,107,003	152,081
Downtown Tracy Station	0	49,735	25,125	42,352	20,927	138,139	18,978
River Islands Station	0	44,209	22,333	11,854	N/A	78,396	10,770
North Lathrop Station	0	54,599	37,688	11,854	N/A	104,140	14,307
Total Construction	1,961,022	1,592,472	340,948	130,657	41,244	4,066,343	558,638
Alternatives Analyzed at an Equal Level of Detail							
Stone Cut Alignment Alternative	606,844	308,687	0	N/A	N/A	915,531	125,777
Southfront Road Station Alternative	0	48,126	24,170	11,633	N/A	83,929	11,359
Mountain House Station Alternative	0	66,313	33,500	11,854	N/A	111,668	15,341
West Tracy OMF	361,157	78,146	55,583	N/A	N/A	494,887	67,988
Downtown Tracy Alternative 1	0	49,735	25,125	N/A	N/A	74,860	10,284
Downtown Tracy Alternative 2	0	49,735	25,125	N/A	N/A	74,860	10,284

[a] Sum of diesel and gasoline
OMF = operation and maintenance facility
MMBtu = millions of British thermal units

The energy expenditure associated with construction of the Proposed Project would be temporary and limited to the duration of the construction period. Many financial incentives are offered by government agencies and utility companies to support energy-efficient investments. Therefore, it is expected that construction materials used and purchased from offsite suppliers would be efficiently produced based on the economic incentive for efficiency. In addition, jurisdictions in which construction would occur require reuse and recycling of construction and demolition materials, which would reduce the inherent energy cost of materials. Non-renewable energy resources would not be consumed in a wasteful, inefficient, or unnecessary manner during construction. Therefore, this impact would be less than significant.

Operations

Operational impacts are those resulting from ongoing, routine, and occasional activities associated with implementation of the Proposed Project. Operation of Valley Link would involve train service, station operations, and OMF operations, all of which would result in an increase in energy usage. However, the Valley Link service, by providing an alternative to driving, would encourage the diversion of travelers and commuters from personal vehicles to passenger rail.

Table 3.6-4 and Table 3.6-5 summarize the estimated consumption of gasoline, diesel fuel, electricity, and natural gas during operation of the Proposed Project. At the end of the table, the total energy usage by source is expressed in millions of British thermal units (MMBtu) to provide a common unit for comparison. Operation of trains accounts for most of the energy usage (expressed in MMBtu) associated with the Proposed Project. Among the train and fuel technologies, total fuel consumption with renewable diesel would be slightly higher than with conventional diesel. The DLH technology variant with renewable diesel fuel would result in the highest diesel fuel consumption for the Proposed Project. DMU fuel consumption would be less than with the DLH technology variant, HBMU fuel consumption would be less than with the DMU technology variant, and BEMU fuel consumption would be lowest.

As shown in Table 3.6-4 and Table 3.6-5, the reduction in VMT and the related decrease in fuel consumption would offset the operational energy demands of the Proposed Project in 2025 and 2040, resulting in a net energy savings relative to no project conditions. The fuel savings from reduced personal vehicle VMT would more than offset the energy demand from train operations, stations, and the OMF.

Energy use benefits achieved through full Proposed Project operation in 2025 would offset the short-term construction energy use in approximately 2 to 3 years of operation (depending on vehicle technology variant). Energy savings achieved thereafter would contribute to reductions in energy use.

Energy demand at new stations would be minimized by compliance with Cal. Code Regs. Title 24 standards. As a result, new stations would not consume electricity in an inefficient manner. Therefore, operation of the Proposed Project stations would not encourage or result in activities that consume large amounts of electricity in an inefficient manner.

In summary, through reductions in automobile VMT and compliance with applicable regulations, including Cal. Code Regs. Title 24, energy impacts from construction and operation of the Proposed Project would be less than significant. Because the impacts would result in less energy use than under no project conditions, the energy savings would be an environmental benefit.

Table 3.6-4. Estimated Energy Usage During Proposed Project Operation, 2025 IOS (compared to No Project Conditions)

	2025 Mountain House IOS			
Energy Use/Savings	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**
Regional Traffic				
VMT Change	(696,874)	(210,761)	0	0
Train Operations				
DMU Variant	0	435,900	0	0
DMU Renewable Diesel	0	453,336	0	0
HBMU Variant	0	386,294	0	0
HBMU Renewable Diesel	0	401,746	0	0
BEMU Variant	0	0	6,238,825	0
DLH Variant	0	547,182	0	0
DLH Variant w/Renewable Diesel	0	569,069	0	0
Station/OMF Operations				
Stations (7)	0	0	32,463	0
Interim OMF	8,008	363	422,500	2,553
Tracy OMF	0	0	0	0
Total Operations (by fuel use)				
DMU Variant	(688,866)	225,501	454,963	2,553
DMU Renewable Diesel	(688,866)	242,937	454,963	2,553
HBMU Variant	(688,866)	175,896	454,963	2,553
HBMU Renewable Diesel	(688,866)	191,348	454,963	2,553
BEMU Variant	(688,866)	(210,398)	6,693,788	2,553
DLH Variant	(688,866)	336,784	454,963	2,553
DLH Variant w/Renewable Diesel	(688,866)	358,671	454,963	2,553
Total Operations (by technology variant)	**2025 Mountain House IOS (MMBTU)**			
DMU Variant	(50,359)			
DMU Renewable Diesel	(47,963)			
HBMU Variant	(57,174)			
HBMU Renewable Diesel	(55,051)			
BEMU Variant	(88,956)			
DLH Variant	(35,071)			
DLH Variant w/Renewable Diesel	(32,064)			

Notes:
gal = gallons; kBtu = thousands of British thermal units; kWh = kilowatt-hours; NA = not applicable; OMF = operation and maintenance facility; MMBtu = millions of British thermal units (Fuel use was converted into MMBtu based on energy intensity factors to allow a combination of all fuels into a single metric).

Table 3.6-5. Estimated Energy Usage During Proposed Project Operation, 2025 and 2040 Full Build (compared to No Project Conditions)

	2025				2040			
Energy Use/Savings	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**
Regional Traffic								
VMT Change	(1,664,313)	(535,953)	0	0	(3,470,853)	(1,216,659)	0	0
Train Operations								
DMU Variant	0	619,295	0	0	0	914,924	0	0
DMU Renewable Diesel	0	644,067	0	0	0	951,521	0	0
HBMU Variant	0	548,819	0	0	0	810,806	0	0
HBMU Renewable Diesel	0	570,772	0	0	0	843,238	0	0
BEMU Variant	0	0	10,342,669	0	0	0	15,885,530	0
DLH Variant	0	778,805	0	0	0	1,149,738	0	0
DLH Variant w/Renewable Diesel	0	809,958	0	0	0	1,195,727	0	0
Station/OMF Operations								
Stations (7)	0	0	56,811	0	0	0	56,811	0
Interim OMF	0	0	0	0	0	0	0	0
Tracy OMF	18,655	845	703,040	4,249	13,697	658	703,040	4,249
Total Operations (by fuel)								
DMU Variant	(1,645,658)	84,187	759,851	4,249	(3,457,156)	(301,077)	759,851	4,249
DMU Renewable Diesel	(1,645,658)	108,959	759,851	4,249	(3,457,156)	(264,480)	759,851	4,249
HBMU Variant	(1,645,658)	13,711	759,851	4,249	(3,457,156)	(405,195)	759,851	4,249
HBMU Renewable Diesel	(1,645,658)	35,664	759,851	4,249	(3,457,156)	(372,763)	759,851	4,249
BEMU Variant	(1,645,658)	(535,108)	11,102,520	4,249	(3,457,156)	(1,216,002)	16,645,381	4,249
DLH Variant	(1,645,658)	243,697	759,851	4,249	(3,457,156)	(66,264)	759,851	4,249
DLH Variant w/Renewable Diesel	(1,645,658)	274,849	759,851	4,249	(3,457,156)	(20,274)	759,851	4,249
Total Operations (by technology variant)	**2025 Operation (MMBTU)**				**2040 Operation (MMBTU)**			
DMU Variant	(183,864)				(454,775)			
DMU Renewable Diesel	(180,461)				(449,748)			
HBMU Variant	(193,546)				(469,079)			
HBMU Renewable Diesel	(190,531)				(464,624)			
BEMU Variant	(233,655)				(526,267)			

Energy Use/Savings	2025				2040			
	Gasoline (gal)	Diesel (gal)	Electric (kWh)	Natural Gas (kBtu)	Gasoline (gal)	Diesel (gal)	Electric (kWh)	Natural Gas (kBtu)
DLH Variant	(1,645,658)				(422,516)			
DLH Variant w/Renewable Diesel	(1,645,658)				(416,198)			

Notes: gal = gallons; kBtu = thousands of British thermal units; kWh = kilowatt-hours; NA = not applicable; OMF = operation and maintenance facility; MMBtu = millions of British thermal units (Fuel use was converted into MMBtu based on energy intensity factors to allow a combination of all fuels into a single metric).

Alternatives Analyzed at an Equal Level of Detail

Construction

As shown in Table 3.6-3, the alternatives would have the following differences relative to construction energy consumption.

- Southfront Road Station Alternative—This alternative would use slightly less energy during construction than the proposed Greenville Station.
- Stone Cut Alignment Alternative—This alternative would use slightly less energy during construction than the proposed Altamont Alignment.
- West Tracy OMF Alternative—This alternative would use slightly less energy during construction than the proposed Tracy OMF.
- Mountain House Station Alternative—This alternative would use slightly more energy during construction than the proposed Mountain House Station.
- Downtown Tracy Station Parking Alternatives 1 and 2—These alternatives would use similar energy during construction as the proposed Downtown Tracy Station in the 2022 to 2024 construction period. The Downtown Tracy Station includes a later expansion of parking in 2037 and 2038 that would result in more construction energy consumption than the two alternatives (which do not include a parking expansion) but the expansion would support expanded ridership. If the parking alternatives included similar parking expansion in later years, they would likely have similar overall construction energy consumption.

Operations

The Stone Cut Alignment Alternative would be approximately 0.4 mile shorter than the proposed Altamont Alignment. As shown in Table 3.6-6 and Table 3.6-7, the reduction in VMT and the related decrease in fuel consumption would offset operational energy demands in 2025 and 2040, resulting in a net energy savings relative to no project conditions. The fuel savings from reduced personal vehicle VMT would more than offset the energy demand from train operations, stations, and the OMF. With the savings in service time, it is probable that the Stone Cut Alignment Alternative would have increased ridership compared to the Proposed Project (although no ridership analysis was completed), likely resulting in a greater reduction of vehicle fuel use due to VMT reduction. Overall, operational energy use of the Stone Cut Alignment Alternative is expected to be less than the Proposed Project (e.g., the Stone Cut Alignment Alternative would have greater energy use reductions than the Proposed Project).

As shown in Table 3.6-8 and Table 3.6-9 for the Southfront Road Station Alternative, the reduction in VMT and the related decrease in fuel consumption would offset the Proposed Project's operational energy demands in 2025 and 2040, resulting in a net energy savings relative to no project conditions. The fuel savings from reduced personal vehicle VMT would more than offset the energy demand of train operations, station operations, and the OMF.

Table 3.6-6. Estimated Energy Usage, Stone Cut Alignment Alternative Operation, 2025 IOS, (compared to No Project Conditions)

	2025 Mountain House IOS			
Energy Use/Savings	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**
Regional Traffic				
VMT Change	(696,874)	(210,761)	0	0
Train Operations				
DMU Variant	0	431,195	0	0
DMU Renewable Diesel	0	448,443	0	0
HBMU Variant	0	382,125	0	0
HBMU Renewable Diesel	0	397,410	0	0
BEMU Variant	0	0	6,171,487	0
DLH Variant	0	541,276	0	0
DLH Variant w/Renewable Diesel	0	562,927	0	0
Station/OMF Operations				
Stations (7)	0	0	32,463	0
Interim OMF	8,008	363	422,500	2,553
Tracy OMF	0	0	0	0
Total Operations (by fuel)				
DMU Variant	(688,866)	220,797	454,963	2,553
DMU Renewable Diesel	(688,866)	238,044	454,963	2,553
HBMU Variant	(688,866)	171,727	454,963	2,553
HBMU Renewable Diesel	(688,866)	187,012	454,963	2,553
BEMU Variant	(688,866)	(210,398)	6,626,450	2,553
DLH Variant	(688,866)	330,878	454,963	2,553
DLH Variant w/Renewable Diesel	(688,866)	352,529	454,963	2,553
Total Operations (by technology variant)	**2025 Mountain House IOS (MMBTU)**			
DMU Variant	(51,005)			
DMU Renewable Diesel	(48,636)			
HBMU Variant	(57,746)			
HBMU Renewable Diesel	(55,647)			
BEMU Variant	(89,186)			
DLH Variant	(35,882)			
DLH Variant w/Renewable Diesel	(32,908)			

Notes:
gal = gallons; kBtu = thousands of British thermal units; kWh = kilowatt-hours; NA = not applicable; OMF = operation and maintenance facility; MMBtu = millions of British thermal units (Fuel use was converted into MMBtu based on energy intensity factors to allow a combination of all fuels into a single metric).

Table 3.6-7. Estimated Energy Usage During Stone Cut Alignment Alternative Operation, 2025 and 2040 Full Build, (compared to No Project Conditions)[a]

	2025				2040			
Energy Use/Savings	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**
Regional Traffic								
VMT Change	(1,664,313)	(535,953)	0	0	(3,470,853)	(1,216,659)	0	0
Train Operations								
DMU Variant	0	612,611	0	0	0	905,049	0	0
DMU Renewable Diesel	0	637,115	0	0	0	941,251	0	0
HBMU Variant	0	542,896	0	0	0	802,055	0	0
HBMU Renewable Diesel	0	564,611	0	0	0	834,137	0	0
BEMU Variant	0	0	10,231,037	0	0	0	15,714,072	0
DLH Variant	0	770,399	0	0	0	1,137,328	0	0
DLH Variant w/Renewable Diesel	0	801,215	0	0	0	1,182,821	0	0
Station/OMF Operations								
Stations (7)	0	0	56,811	0	0	0	56,811	0
Interim OMF	0	0	0	0	0	0	0	0
Tracy OMF	18,655	845	703,040	4,2489	13,697	658	703,040	4,249
Total Operations (by fuel)								
DMU Variant	(1,645,658)	77,503	759,851	4,249	(3,457,156)	(310,952)	759,851	4,249
DMU Renewable Diesel	(1,645,658)	102,007	759,851	4,249	(3,457,156)	(274,750)	759,851	4,249
HBMU Variant	(1,645,658)	7,787	759,851	4,249	(3,457,156)	(413,947)	759,851	4,249
HBMU Renewable Diesel	(1,645,658)	29,503	759,851	4,249	(3,457,156)	(381,865)	759,851	4,249
BEMU Variant	(1,645,658)	(535,108)	10,990,888	4,249	(3,457,156)	(1,216,002)	16,473,923	4,249
DLH Variant	(1,645,658)	235,291	759,851	4,249	(3,457,156)	(78,673)	759,851	4,249
DLH Variant w/Renewable Diesel	(1,645,658)	266,107	759,851	4,249	(3,457,156)	(33,180)	759,851	4,249
Total Operations (by technology variant)	**2025 Operation (MMBTU)**				**2040 Operation (MMBTU)**			
DMU Variant	(184,783)				(456,132)			
DMU Renewable Diesel	(181,416)				(451,159)			
HBMU Variant	(194,360)				(470,282)			
HBMU Renewable Diesel	(191,377)				(465,874)			

Energy Use/Savings	2025				2040			
	Gasoline (gal)	Diesel (gal)	Electric (kWh)	Natural Gas (kBtu)	Gasoline (gal)	Diesel (gal)	Electric (kWh)	Natural Gas (kBtu)
BEMU Variant	(234,036)				(526,852)			
DLH Variant	(163,106)				(424,221)			
DLH Variant w/Renewable Diesel	(158,872)				(417,971)			

[a] Calculations do not include any potential increase in ridership (and associated VMT-related GHG emissions reductions) with the alternative, although service times will improve compared to the Proposed Project.
gal = gallons; kBtu = thousands of British thermal units; kWh = kilowatt-hours; NA = not applicable; OMF = operation and maintenance facility; MMBtu = millions of British thermal units (Fuel use was converted into MMBtu based on energy intensity factors to allow a combination of all fuels into a single metric).

Table 3.6-8. Estimated Energy Usage, Southfront Road Station Alternative Operation, 2025 IOS, (compared to No Project Conditions)

	2025 Mountain House IOS			
Energy Use/Savings	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**
Regional Traffic				
VMT Change	(739,456)	(223,639)	0	0
Train Operations				
DMU Variant	0	435,900	0	0
DMU Renewable Diesel	0	453,336	0	0
HBMU Variant	0	386,294	0	0
HBMU Renewable Diesel	0	401,746	0	0
BEMU Variant	0	0	6,238,825	0
DLH Variant	0	547,182	0	0
DLH Variant w/Renewable Diesel	0	569,069	0	0
Station/OMF Operations				
Stations (7)	0	0	32,463	0
Interim OMF	8,008	363	422,500	2,553
Tracy OMF	0	0	0	0
Total Operations (by fuel)				
DMU Variant	(731,448)	212,623	454,963	2,553
DMU Renewable Diesel	(731,448)	230,059	454,963	2,553
HBMU Variant	(731,448)	163,018	454,963	2,553
HBMU Renewable Diesel	(731,448)	178,469	454,963	2,553
BEMU Variant	(731,448)	(223,277)	6,693,788	2,553
DLH Variant	(731,448)	323,905	454,963	2,553
DLH Variant w/Renewable Diesel	(731,448)	345,792	454,963	2,553
Total Operations (by technology variant)	**2025 Mountain House IOS (MMBTU)**			
DMU Variant	(57,252)			
DMU Renewable Diesel	(54,857)			
HBMU Variant	(64,067)			
HBMU Renewable Diesel	(61,944)			
BEMU Variant	(95,850)			
DLH Variant	(41,964)			
DLH Variant w/Renewable Diesel	(38,957)			

Notes:
gal = gallons; kBtu = thousands of British thermal units; kWh = kilowatt-hours; NA = not applicable; OMF = operation and maintenance facility; MMBtu = millions of British thermal units (Fuel use was converted into MMBtu based on energy intensity factors to allow a combination of all fuels into a single metric).

Table 3.6-9. Estimated Energy Usage During Southfront Road Station Alternative Operation, 2025 and 2040 Full Build, (compared to No Project Conditions)

	2025				2040			
Energy Use/Savings	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**	**Gasoline (gal)**	**Diesel (gal)**	**Electric (kWh)**	**Natural Gas (kBtu)**
Regional Traffic								
VMT Change	(1,695,575)	(546,020)	0	0	(3,608,066)	(1,264,757)	0	0
Train Operations								
DMU Variant	0	619,295	0	0	0	914,924	0	0
DMU Renewable Diesel	0	644,067	0	0	0	951,521	0	0
HBMU Variant	0	548,819	0	0	0	810,806	0	0
HBMU Renewable Diesel	0	570,772	0	0	0	843,238	0	0
BEMU Variant	0	0	10,342,669	0	0	0	15,885,530	0
DLH Variant	0	778,805	0	0	0	1,149,738	0	0
DLH Variant w/Renewable Diesel	0	809,958	0	0	0	1,195,727	0	0
Station/OMF Operations								
Stations (7)	0	0	56,811	0	0	0	56,811	0
Interim OMF	0	0	0	0	0	0	0	0
Tracy OMF	18,655	845	703,040	4,249	13,697	658	703,040	4,249
Total Operations (by fuel)								
DMU Variant	(1,676,920)	74,119	759,851	4,249	(3,594,369)	(349,175)	759,851	4,249
DMU Renewable Diesel	(1,676,920)	98,891	759,851	4,249	(3,594,369)	(312,578)	759,851	4,249
HBMU Variant	(1,676,920)	3,644	759,851	4,249	(3,594,369)	(453,293)	759,851	4,249
HBMU Renewable Diesel	(1,676,920)	25,596	759,851	4,249	(3,594,369)	(420,861)	759,851	4,249
BEMU Variant	(1,676,920)	(545,176)	11,102,520	4,249	(3,594,369)	(1,264,099)	16,645,381	4,249
DLH Variant	(1,676,920)	233,630	759,851	4,249	(3,594,369)	(114,362)	759,851	4,249
DLH Variant w/Renewable Diesel	(1,676,920)	264,782	759,851	4,249	(3,594,369)	(68,372)	759,851	4,249
Total Operations (by technology variant)	**2025 Operation (MMBTU)**				**2040 Operation (MMBTU)**			
DMU Variant	(189,009)				(477,894)			
DMU Renewable Diesel	(185,606)				(472,867)			
HBMU Variant	(198,691)				(492,198)			

<table>
<tr><th rowspan="2">Energy Use/Savings</th><th colspan="4">2025</th><th colspan="4">2040</th></tr>
<tr><th>Gasoline (gal)</th><th>Diesel (gal)</th><th>Electric (kWh)</th><th>Natural Gas (kBtu)</th><th>Gasoline (gal)</th><th>Diesel (gal)</th><th>Electric (kWh)</th><th>Natural Gas (kBtu)</th></tr>
<tr><td>HBMU Renewable Diesel</td><td colspan="4">(195,676)</td><td colspan="4">(487,743)</td></tr>
<tr><td>BEMU Variant</td><td colspan="4">(238,800)</td><td colspan="4">(549,386)</td></tr>
<tr><td>DLH Variant</td><td colspan="4">(167,096)</td><td colspan="4">(445,635)</td></tr>
<tr><td>DLH Variant w/Renewable Diesel</td><td colspan="4">(162,816)</td><td colspan="4">(439,317)</td></tr>
</table>

Notes:
gal = gallons; kBtu = thousands of British thermal units; kWh = kilowatt-hours; NA = not applicable; OMF = operation and maintenance facility; MMBtu = millions of British thermal units (Fuel use was converted into MMBtu based on energy intensity factors to allow a combination of all fuels into a single metric).

Impact EN-2: Construction, operation, and maintenance of the Proposed Project could result in a substantial increase in energy demand that would affect local or regional energy supplies and require additional capacity during peak and base period demands for electricity to meet that increased demand.

Level of Impact	**Less than significant (beneficial)**
Mitigation Measures	**None required**

Impact Characterization and Conclusion

Proposed Project

Construction

As discussed in Impact EN-1, during construction of the Proposed Project, energy would be used to produce and transport construction materials, to operate construction equipment and trucks, and for worker commuting. Large equipment and trucks used for construction would be powered with diesel fuel. Overall, energy consumption would involve mostly diesel fuel for construction equipment and transport, with smaller amounts of gasoline for worker commuting, and negligible quantities of electricity required. Demand for electricity during construction could potentially result from the use of lighting, generators, or other mechanical equipment, to the extent that these are supplied by PG&E power rather than onsite engines. However, such use of electricity would be intermittent during construction and would account for only a small fraction of total construction energy usage.

Energy consumption during construction would not result in a substantial increase in energy demand that would affect local or regional energy supplies as outlined in Section 3.6.3.2, *Petroleum, Electricity, and Natural Gas*. Diesel fuel for construction could be obtained from the Chevron Richmond Refinery and other refineries in the region that would be determined by construction contractors. As stated in Section 3.6.3.2, the Chevron Richmond Refinery is a large processing facility, and the demand for diesel fuel for construction would be a small percentage of the production capacity of this refinery and others that could meet the construction energy needs.

Large equipment used for construction would be powered with diesel fuel, which would not require electricity directly from the regional power grid. As a result, construction activities would not significantly increase peak electricity demands or base period electricity demands. PG&E would be able to accommodate the increase in temporary electricity use with existing resources. Electricity consumption during construction would not be substantial and, thus, would not affect the ability of PG&E to serve the region with existing supplies. Therefore, this impact would be less than significant.

Operation

Operation of the Proposed Project would involve train service and operation of new stations and the OMF, all of which would result in energy consumption. The energy consumption would be associated primarily with the trains' consumption of diesel fuel and the usage of electricity at the stations and OMF. Lighting, mechanical systems, and maintenance activities at the stations and OMF would result in demand for electricity.

The energy consumption during operation would not result in a substantial increase in energy demand that would affect local or regional energy supplies identified in Section 3.6.3.2. The demand for diesel fuel to operate the trains would be minor (i.e., about 0.003 percent) compared to the petroleum-producing capacity at the Chevron Richmond Refinery.

During operation, DMU or HBMU trains would run on diesel fuel, which would not require electricity from the grid. BEMU trains would require grid electricity. The new stations and OMF are estimated to increase demand for electricity by approximately 776,000 kWh (0.776 gWh) per year. Given that PG&E supplied 48,832 gWh in 2018 as discussed in Section 3.6.3.2, the net addition of 0.76 gWh per year (or more with BEMU trains) would represent a negligible amount in the context of the electricity demanded annually in PG&E's service area.

During operation, the new stations and OMF would comply with applicable Cal. Code Regs. Title 24 standards, which require installation and maintenance of energy-efficient electrical systems in new construction. The proposed stations and OMF would not result in a substantial increase in energy demand that would affect local or regional energy supplies or require additional capacity to meet that increased demand.

Overall, the Proposed Project would represent a negligible amount of the electricity demand in the PG&E service area. Moreover, electrical demand at the proposed stations is expected to be relatively constant, as electrical demand would not be subject to changes in train operation; therefore, the Proposed Project is not expected to affect peak demand in the PG&E service area, and this impact would be less than significant.

Alternatives Analyzed at an Equal Level of Detail

The comparative impacts of the alternatives analyzed at an equal level of detail are summarized below.

- Southfront Road Station Alternative versus Greenville Station—Fuel consumption for construction of the proposed Greenville Station would be slightly less than that for the Southfront Road Station Alternative. Net energy usage for operation of the Southfront Road Station Alternative would be less than that for operation of the Greenville Station due to higher ridership for the Southfront Road Station Alternative and related greater reductions in personal vehicle fuel use.
- Stone Cut Alignment Alternative versus proposed Altamont Alignment—Fuel consumption for construction of the Stone Cut Alignment Alternative would be slightly less than that for the proposed Altamont Alignment. Net energy usage for operation of the Stone Cut Alignment Alternative would also be less than the proposed Altamont Alignment.
- Tracy OMF versus West Tracy OMF Alternative—Fuel consumption for construction of the West Tracy OMF Alternative would be slightly less than the proposed Tracy OMF. Energy usage for operation of the proposed Tracy OMF and the West Tracy OMF Alternative would be similar for each facility.
- Mountain House Station versus Mountain House Station Alternative—Fuel consumption for construction of the Mountain House Station Alternative would be slightly greater than that for construction of the Mountain House Station. Energy usage for operation of the Mountain House Station Alternative would be similar to that for operation of the Mountain House Station.

- Downtown Tracy Station versus Downtown Tracy Station Parking Alternatives 1 and 2. Fuel consumption for construction of the Downtown Tracy Station Parking Alternatives 1 and 2 would be slightly lower than that for construction of the proposed Downtown Tracy Station (due to less grading). Energy usage for operation of the Downtown Tracy Station Parking Alternatives 1 and 2 would be similar to that for operation of the proposed Downtown Tracy Station.