4.8 ENERGY

4.8.1 INTRODUCTION

Energy reliability and supply have become an increasing concern in California. The short-term situation has been very unstable for both the price and availability of electricity and, to a lesser extent, natural gas. Transportation improvements require energy to construct, operate, and maintain. Energy for construction includes, in addition to the energy used by construction equipment and other activities at the worksite, the energy used to manufacture equipment, materials, and supplies and transport them to the worksite. Energy for the operation of transportation systems is primarily that consumed by vehicles transporting people or goods — propulsion energy — but also includes energy used to operate facilities.

Energy consumed in the operation and maintenance of transportation systems is referred to as the **long-term operating energy** requirement and energy consumed in construction is referred to as the **indirect construction energy** requirement. Over the life of a transportation project, long-term operating energy consumption is usually the largest component of total system energy use. In the current unstable energy environment, the ongoing energy requirements of new activities are of concern, including their impacts on future energy supplies. From an energy conservation standpoint, therefore, long-term operating energy impacts are of more importance than indirect construction energy impacts. For these reasons, the energy analysis focuses on the long-term energy requirements of the SVRTC alternatives. It compares transportation system energy use with and without the proposed project improvements.

4.8.2 EXISTING CONDITIONS

4.8.2.1 Existing Setting

Various forms of energy are used in vehicle propulsion and the operation of transportation facilities. Automobiles and trucks would continue to operate within the transportation system in 2025 and use a variety of energy forms, from gasoline to diesel to electricity to hydrogen, or a combination of these or other forms. Transit buses and trains would continue to provide service and consume similar forms of energy. The environmental assessment considered the supply and demand for three types: electricity, natural gas, and other petroleum-based fuels such as gasoline and diesel fuel.

Existing State Electricity Generation and Demand. In-state electricity generation, which accounted for 85% of the 2001 total electrical supply, is fueled by natural gas (42.7%); nuclear sources (12.6%); coal (10.4%); large hydroelectric resources (8.0%); petroleum (0.5%); and renewable resources including wind, solar, and geothermal (10.5%). Intermontane and Mohave coal plants are considered in-state because they are in located in areas controlled by the State of California. Electricity imports in 2001 were 15% of total production. Imports from the Pacific Northwest and the southwest accounted for 2.6% and 12.8% respectively. (California Energy Commission 2003(a)).

Pacific Gas & Electric Company (PG&E) is the largest publicly owned utility in California and is the electricity and natural gas provider for residential, industrial, and agency consumers within the SVRTC project area. PG&E buys power from a diverse mix of generating sources, including fossil-fueled plants, hydroelectric powerhouses, wind farms, and nuclear power plants. In addition to electrical power purchased from PG&E, BART purchases power directly from the Bonneville Power Administration (BPA), which is a federal agency headquartered in Portland, Oregon that markets power to large portions of the Northwest in addition California. The majority of the power sold by BPA is hydroelectrically generated.

According to the California Energy Commission (CEC), total statewide electricity consumption grew from 166,979 gigawatt-hours (GWh) in 1980 to 228,038 GWh in 1990, at an estimated annual growth rate of 3.2%.[1] The 1990s saw a slowdown in demand growth because of the recession that lasted through the early and middle parts of the decade. The statewide electricity consumption in 1998 was 244,599 GWh, reflecting an annual growth rate of 0.9% between 1990 and 1998 (CEC 2002a). In 2001, statewide consumption was about 250,000 GWh (CEC 2002b).

Peak electricity demand, expressed in megawatts (MW), measures the largest electric power requirement during a specified period, usually integrated over one hour. A single MW is enough power to meet the expected electricity needs of 1,000 typical California homes (CEC 2003b). Peak demand is important in evaluating system reliability, determining congestion points on the electrical grid, and identifying potential areas where additional transmission, distribution, and generation facilities may be needed. California's peak demand typically occurs in August between 3:00 p.m. and 5:00 p.m. High temperatures lead to increased use of air conditioning, which in combination with industrial loads, commercial lighting, and office equipment comprise the major demand for electricity consumption in the peak demand period in the state (CEC 2000). In 2003, peak electricity demand for California is predicted to be about 52,150 MW, which does not include 7% operating reserve. Peak generating capacity for the state is expected to be about 59,696 MW in 2003 (CEC 2003c). This includes net dependable generating additions of about 3,600 MW, as of July 2003, and forced and planned outages of 3,750 MW but does not include spot market imports of 3,721 MW. The California Independent State Operator (Cal ISO) controls the electrical grid that distributes about 82% of the electricity consumed in the state with the remainder being distributed by municipal utilities.

Electricity Generation and Demand Outlook. Studies have been conducted by the CEC to predict the short- and long-term outlooks for electricity supply and demand balance in California. According to its 2003 staff report titled, *California's Electricity Supply and Demand Balance over the Next Five Years*, the CEC believes that the near-term outlook for supply adequacy is promising. In the Cal ISO-controlled grid where supply is expected to outpace demand by approximately 6,000 MW, which includes an operating reserve of 5,707 MW, (CEC 2003c), a 16% operating margin[2] was estimated for summer 2003 assuming a 1-in-2 year peak temperature condition. According to CEC staff, a statewide planning reserve margin of 8.8% is projected as far out as August 2008 when statewide supply capacity is anticipated to be 64,669 MW, outpacing a statewide projected demand of 59,459 MW (CEC 2003c). The statewide planning reserve margin differs from the operating margin by not including the 7% operating reserve in the calculation, and does not account for forced outages nor includes spot market purchases. It is used in extended planning horizons (CEC 2003a). The apparent decline in margins between the summers of 2003 and 2008 stems from the fact that the planning horizon for electric power resource additions is usually only two to three years out and does not necessarily indicate a downward trend in generating capacity. Demand projection assumes a normal summer. A hot summer increases projected demand to 62,914 MW, which corresponds to a 3.0% planning reserve margin.

This short planning horizon interjects uncertainty into the assessment of supply and reserve margin in 2025, the study year for the BART Alternative. However, the state has added substantial generating capacity in the last two years and it is reasonable to assume it will continue to add capacity. Between 2000 and February 2003, California licensed and added 18 new power plants, which have contributed 4,980 MW to the statewide generating capacity. Power plants representing an additional 3,106 MW of

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[1] Electric energy is measured in watts (W): 1,000 watts is a kilowatt (kW); 1,000 kilowatts is a megawatt (MW); 1,000 megawatts is a gigawatt (GW). Electric consumption over time is measured in kilowatt-hours (kWh), megawatt-hours (MWh), and gigawatt-hours (GWh).

[2] Operating Margin is the percentage by which demand outpaces supply; includes a 7% operating reserve in the calculation (CEC 2003b).

generating capacity were anticipated to come online between February 2003 and August 2003 (CEC 2003d). Statewide demand in 2012 would most likely be around 64,845 MW, assuming normal summer temperatures (CEC 2002b). Using the growth trend that fits CEC demand predictions through 2012, published in the *2002–2012 Electricity Outlook*, demand for electricity in 2025 can be estimated to be on the order of 85,000 MW.[3] The Cal ISO estimates that net additions of domestic electricity generation capacity and electricity imports of 1,000 to 1,500 MW/year will be necessary to maintain current operating margins (Cal ISO 2002b).

Transmission Outlook. Transmission capacity refers to the maximum amount of power that can be carried from the generating source to the utility provider and is a key component in the electrical power delivery system. In the years since the start of the electricity crisis, the transmission capabilities of some portions of the state's electrical grid have occasionally been inadequate to transmit electricity at a rate that satisfies the quantities of electricity demanded. This phenomenon is known as a transmission bottleneck. An example of one such bottleneck occurs through what is known as Path 15, a major transmission line between Northern and Southern California. According to the Western Area Power Administration (WAPA), PG&E plans to increase the rating of Path 15 from 3,900 MW to 5,400 MW, which is expected to be completed by 2004 (WAPA 2002). Improvements to other transmission paths are also planned, for example the link between California and the southwest (Palo Verde-Devers Path) and the interconnect with the Tehachapi wind resource area (Consumer Power and Conservation Financing Authority, Energy Resources Conservation and Development Commission, and California Public Utilities Commission 2003).

Natural Gas. PG&E is the main gas utility in the study area. PG&E is not a producer of natural gas but purchases natural gas from various suppliers and distributes gas to residential and commercial/industrial users through its local network. About 67 percent of PG&E's natural gas supplies come from Canada and 10 percent from California (PG&E Corp, Annual Report, various years). The major natural gas inter- and intrastate pipelines that deliver natural gas to PG&E are controlled by relatively few pipeline companies, but access to their pipelines is afforded to all qualifying suppliers.

The State of California has become less of a source of natural gas supply, as its available resources are depleted. Throughout North America and elsewhere, however, natural gas reserves are considered plentiful and adequate to sustain production for many years. According to the U.S. Department of Energy, Energy Information Administration, U.S. proven reserves of wet natural gas were 164 trillion cubic feet in 1999, with technically recoverable reserves almost eight times this figure (U.S. Natural Gas Markets: Recent Trends and Prospects for the Future, May 2001, USDOE, Energy Information Administration). Annual natural gas production in the U.S. varies from 19 to 22 trillion cubic feet. In addition to U.S. reserves, there are substantial reserves in Canada.

Other Petroleum-Based Fuels. Despite short-term volatility in gasoline and diesel fuel prices, the petroleum fuels market is competitive, with a number of potential suppliers and distributors. Supply over the next 15 to 20 years is not considered a critical problem. Distribution of fuel is by a number of methods, from pipelines to railroads to trucks. As oil reserves diminish, higher prices are likely to encourage shifts to alternative fuels. The risks in the mid-term are primarily in the production of oil, which can be disrupted by political events.

[3] Calculation based on CEC demand projections from 2002 to 2012 for normal temperature years, published in *2002 – 2012 Electricity Outlook* (California Energy Commission 2002b). Projection to 2025 assumes an average annual growth rate of about 2.0% with a range from between 1.5% and 3.9%. This projection is for comparison purposes only.

4.8.2.2 Regulatory Setting

Corporate Average Fuel Economy Standards

Corporate Average Fuel Economy (CAFE) standards are federal regulations that are set to reduce energy consumed by on-road motor vehicles. The standards specify minimum fuel consumption efficiency standards for new automobiles sold in the U.S. The current standard for passenger cars is 27.5 miles per gallon (mpg). The 1998 standard for light trucks was 20.7 mpg (Competitive Enterprise Institute 1996). In April 2002, the National Highway Traffic Safety Administration issued a final rule for CAFE standards for model-year 2004 light trucks that codified a standard of 20.7 mpg; this is now in effect (USDOT 2002a).

Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century, passed in 1998, is intended to protect and enhance communities and the natural environment as development occurs in the transportation sector. It builds on the initiatives established in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), which was the previous major authorizing legislation for surface transportation. The ISTEA identified planning factors for use by the Metropolitan Planning Organizations (MPOs), including MTC, in developing transportation plans and programs. Under the ISTEA, MPOs are required to "protect and enhance the environment, promote energy conservation, and improve quality of life" and are required to consider the consistency of transportation planning with federal, state, and local energy goals (USDOT 2002b).

California Code of Regulations, Title 24, Part 6, Energy Efficiency Standards

Title 24, Part 6 of the California Code of Regulations (CCR), *Energy Efficiency Standards*, promotes efficient energy use in new buildings constructed in California. The standards regulate energy consumed for heating, cooling, ventilation, water heating, and lighting. The standards are enforced through the local building permit process.

California Assembly Bill 1X

On February 1, 2001, Governor Gray Davis signed into law California Assembly Bill 1X (AB1X), which authorized the California Department of Water Resources to purchase electricity under long-term contracts to re-sell to two utilities: PG&E and Southern California Edison. This law was passed because, as a result of financial constraints, the two utilities were unable to obtain long-term power contracts with power generators. AB1X is significant because it made the state government an active participant in California's power industry (CEC 2002b).

4.8.3 IMPACT ASSESSMENT AND MITIGATION MEASURES

4.8.3.1 Impacts

No-Action Alternative

Transportation modes in 2025 under the No-Action Alternative would not change substantially compared to existing conditions. Although light rail and commuter rail services would operate in the study area and continue to be improved, autos and buses would be the main modes available to meet increasing travel demand, particularly in the travel corridor between southern Fremont and central San Jose. Increased auto and bus travel would increase the use of petroleum-based fuels or their substitutes. (See Section 3.2.1.2 for a list of future projects under the No-Action Alternative.)

Baseline Alternative

Energy impacts would be similar to those of the No-Action Alternative. The Baseline Alternative assumes the same levels of service for VTA LRT, ACE, and Caltrain commuter rail service as under the No-Action Alternative. The distinguishing difference between the Baseline and No-Action alternatives is in the level of local and regional bus services. Both VTA and other bus services (e.g., Tri-Valley, Central Valley, and Contra Costa County) would be expanded relative to the No-Action Alternative. From a transit energy impacts standpoint, therefore, the Baseline Alternative would result in an increase in energy used for bus propulsion compared to the No-Action Alternative. The Baseline Alternative would also require additional energy for the operation of facilities used to maintain and store additional buses. However, there would also be a corresponding decrease in vehicles miles traveled (VMT) and energy use by private vehicles.

The types of energy to be used by buses in the future are likely to shift and include, in addition to petroleum-based fuels such as diesel and compressed natural gas, possibly hydrogen and electricity. VTA has primarily a clean diesel fleet but is procuring fuel-cell buses. Other technologies may become more prominent by 2025. For the impact assessment, bus energy requirements were expressed in terms of gallons of diesel-fuel equivalents to provide a common unit of comparison. (Auto energy requirements were similarly simplified by using gallons of gasoline equivalents to represent the various forms of propulsion energy that might propel autos in the future.)

BART Alternative

The BART Alternative assumes continuing the bus, light rail, and commuter rail services that are also operated under the No-Action and Baseline alternatives. VTA LRT, ACE, and Caltrain commuter rail service would not change relative to the No-Action and Baseline alternatives; bus and BART service levels would both increase relative to the No-Action Alternative. As assumed for the Baseline Alternative, new bus service to the Central Valley, Tri-Valley, and Contra Costa County would be provided, but the overall increase in service would be less and the patterns would differ. Relative to the No-Action Alternative, the BART Alternative would result in an increase in energy for bus propulsion; relative to the Baseline Alternative, a decrease in energy for bus propulsion is anticipated.

BART service extended south of Warm Springs to San Jose/Santa Clara would result in an increase in propulsion energy used by BART trains in comparison to both the No-Action and Baseline alternatives. BART service is provided by electrically powered, multiple-car trains, or “consists.” Electricity is delivered from the local power transmission grid to traction power substations, which distribute power to the third rail. BART vehicles draw power from the third rail for both traction motors and auxiliary power needs (lighting, heating/air conditioning, communications, etc.).

The BART Alternative would locate approximately ten traction power stations and three bulk substations along the BART alignment, including the proposed BART Maintenance Facility in Santa Clara. Traction power substations would transform 34.5 kV AC power supplied through the local power transmission system to 1000 V DC power used by vehicles.

Administrative and related facilities built as part of the BART Alternative would use electric power as the main form of energy. These facilities may receive power (similar to stations) through BART’s traction power substations and local transmission network or directly from the existing local power transmission system.

Methodology and Impacts

Overall Direct Energy. The direct energy requirements of SVRTC project alternatives were estimated based upon the VMT forecast for each major transportation mode in 2025. The travel demand model (see Section 4.2, *Transportation and Transit*) generates projections of hourly/weekday vehicle trips and corresponding VMT for five modes: bus, LRT, BART, commuter rail, and auto (including trucks). VMT was annualized for each mode using expansion factors derived from, in the case of transit modes, conceptual service plans, and, in the case of autos, historical relationships of weekday and annual vehicle trips. (Annual auto trips (or VMT) were estimated by multiplying average weekday trips (VMT) by 320.)

Table 4.8-1 summarizes the estimated annual VMT for each SVRTC project alternative by mode. As shown, the No-Action Alternative is projected to generate the most VMT in 2025, while the BART Alternative would generate the least. At the transportation system level, however, the differences are not great. This is because of the very high VMT associated with auto travel in a large travel study area. For individual modes and for auto travel on an absolute level, the changes in VMT are more significant. The BART Alternative, for example, is estimated to generate 12 percent more transit VMT than the No-Action Alternative and 9 percent more transit VMT than the Baseline Alternative. The BART Alternative is also projected to divert a number of auto trips to transit and decrease auto VMT by 345.7 million annually compared to the No-Action Alternative and by 303.2 million annually compared to the Baseline Alternative. These changes in travel patterns more than offset the increase in transit vehicle trips and VMT.

Table 4.8-1: Annual VMT for Vehicle Operations By Mode and By Alternative (2025)
(all figures in millions)

Mode	No-Action	Baseline	BART
	Annual Vehicle Miles	**Annual Vehicle Miles**	**Annual Vehicle Miles**
Bus	29.6	33.7	30.8
LRT	5.3	5.3	5.3
BART	97.4	97.4	112.1
Commuter Rail	2.7	2.7	2.7
Subtotal	*135.0*	*139.1*	*150.9*
Auto/Truck	53,548.4	53,505.9	53,202.7
Total	**53,683.4**	**53,645.0**	**53,353.6**
Difference from Baseline	38.4	0.0	(291.4)
Percent Change	0.07%	0.00%	-0.54%
Difference from No-Action	0.0	(38.4)	(329.8)
Percent Change	0.00%	-0.07%	-0.61%

Sources: VTA, 2003. For transit VMT, Manuel Padron & Associates, 2003. For auto/truck VMT, Hexagon Transportation Consultants, 2003.

VMT was converted to energy use using fuel efficiency factors, for example gallons of gasoline or diesel fuel or kilowatt hours (kWh) of electricity consumed per vehicle mile. These factors are listed in Table 4.8-2. Because transit and auto modes consume different types of energy, to provide for a common measure of comparison, kWh of electricity or gallons of fossil fuels consumed (or saved) were converted to their British thermal unit (BTU) equivalents. Energy use is expressed at two levels: in terms of the direct energy content of electricity and fuels consumed (or saved) as well as the total energy content of each energy unit. The former is the specific energy available at the point of use while the latter also includes the energy required to generate/refine and transmit/transport the energy unit to the final point

Table 4.8-2: Direct and Total Energy Use by Transit and Auto Modes (2025)

Mode	Energy Unit [1]	Direct Energy BTUs per Energy Unit [2]	Total Energy BTUs per Energy Unit [3]	Ratio Total to Direct	Modal Energy Use per Veh. Mi. [4]		Direct BTUs	Total BTUs
Bus	Gal. diesel equiv.	125,000	143,750	1.15	0.17	gal	20,875	24,006
LRT	Kilowatt-hour (kWh)	3,416	8,000	2.34	8.50	kWh	29,036	68,000
BART	Kilowatt-hour (kWh)	3,416	8,000	2.34	4.00	kWh	13,664	32,000
Commuter Rail	Gal. diesel	125,000	143,750	1.15	0.62	gal	76,875	88,406
							-	-
Auto/Truck	Gal. gasoline equiv.	110,400	132,480	1.20	0.04	gal	3,864	4,637

Notes:

[1] Primary form of energy used. For bus and auto, various energy sources may be in use in 2025. These could include electric, hybrid gas-electric, fuel cell, and gasoline. These have been expressed in one energy type and in the energy content equivalent for that type.

[2] The net energy content of energy unit at its point of use.

[3] The total energy content of energy unit, including energy used to refine/generate and transport to point of use.

[4] Assumes bus fuel economy of 6 mpg, commuter rail of 1.6 vehicle mpg, and combined auto/truck economy of 28.5 mpg.

Sources: Parsons Corp., 2003; Energy and Transportation Systems, Caltrans, 1983; PG&E.

of use. For instance, a kWh has a final or direct energy content of 3,416 BTUs, but an additional approximately 4,600 BTUs of energy was required to generate and transmit the kWh to its point of use. The total energy content of a kWh is estimated to be, therefore, approximately 8,000 BTUs.

Direct and total energy use, by mode, for vehicle operations was converted to direct and total energy use for each project alternative by multiplying energy use in BTUs per vehicle mile by the annual VMT by mode.

Annual direct and total energy for vehicle operations is shown in Table 4.8-3. Direct vehicle BTUs are consistent with the FTA New Starts energy calculations. The BART Alternative is estimated to require 1,110 billion fewer BTUs per year in direct energy and 1,103 billion fewer BTUs in total energy to operate than the No-Action Alternative. For vehicle operations, the BART Alternative is estimated to require 1,030 billion fewer BTUs per year in direct energy and 1,103 billion fewer BTUs in total energy to operate than the Baseline Alternative. Compared to the Baseline Alternative, the savings in direct BTUs for vehicles for the BART Alternative are equivalent to reducing gasoline consumption by approximately 10 million gallons annually, based on direct energy content. (A gallon of gasoline has a direct energy content of 110,400 BTUs.)

In addition to energy for vehicle operations, energy for facility operations was estimated for each transportation mode and SVRTC project alternative. This “other” energy requirement was calculated on a percentage basis. For example, about 20 to 25 percent of BART’s existing power requirements are for station and other facilities operations (the other 75 percent being for vehicle propulsion). It was assumed this relationship would apply to the BART extension as well. The facilities and other energy requirements for other transit modes were estimated to be 10 percent of the total power requirements for a mode. No facilities or other energy requirements were estimated for auto. This was because the change in auto VMT for all SVRTC project alternatives was marginal relative to total transportation system auto VMT. The relatively small change was determined not to have a measurable effect on the annual energy required to operate and maintain the road and highway system. Like the analysis of propulsion energy impacts, the energy requirements for facilities and other operations were estimated in terms of both direct and total energy.

The estimates of energy consumed in vehicle propulsion and in facilities operation were combined to yield a net energy requirement for each SVRTC project alternative. Table 4.8-4 shows the net annual direct and total energy use by alternative, with a further breakdown by mode. The BART Alternative is estimated to require 1,040 billion fewer BTUs per year in direct energy and 944 billion fewer BTUs in total energy to operate than the No-Action Alternative. The BART Alternative is estimated to require 969 billion fewer BTUs per year in direct energy and 854 billion fewer BTUs in total energy to operate than the Baseline Alternative. Compared to the Baseline, the savings in direct BTUs for the BART Alternative are equivalent to reducing gasoline consumption by approximately eight million gallons annually, based on direct energy content. (A gallon of gasoline has a direct energy content of 110,400 BTUs).

MOS-1E is estimated to require 49 billion more BTUs in direct energy and 52 billion more BTUs in total energy for vehicle operations than the full-build BART Alternative. Relative to vehicle operations along with facilities operation, which results in a net energy requirement, MOS-1E would yield 50 billion more BTUs in direct energy and 55 billion more BTUs in total energy than the full-build BART Alternative. As is true of the full-build BART Alternative, the MOS scenarios would save considerable energy over either the No-Action or Baseline alternative.

The most energy intensive alternative is the No-Action Alternative and the least energy intensive is the BART Alternative. This relationship reflects the fact the BART Alternative results in an annual energy savings from reduced auto travel that more than offsets the additional energy requirements of operating more transit service.

Table 4.8-3: Annual Direct and Total Energy Use for Vehicle Operations by Mode by Alternative (2025)*

Mode	No-Action		Baseline		BART Extension	
	Direct BTUs	**Total BTUs**	**Direct BTUs**	**Total BTUs**	**Direct BTUs**	**Total BTUs**
Bus	618,697	711,494	702,771	808,178	643,659	740,201
LRT	154,021	360,706	154,021	360,706	154,021	360,706
BART	1,331,270	3,117,728	1,331,270	3,117,728	1,532,117	3,588,096
Commuter Rail	211,267	242,956	211,267	242,956	211,267	242,956
Subtotal	*2,315,255*	*4,432,884*	*2,399,329*	*4,529,568*	*2,541,065*	*4,931,959*
Auto/Truck	206,910,854	248,303,735	206,746,745	248,106,795	205,575,391	246,701,110
Total	**209,226,109**	**252,736,619**	**209,146,073**	**252,636,363**	**208,116,456**	**251,633,069**
Difference from Baseline	**80,035.74**	**100,256.06**	**0.00**	**0.00**	**(1,029,617.54)**	**(1,003,293.98)**
Percent Change	*0.04%*	*0.04%*	*0.00%*	*0.00%*	*-0.49%*	*-0.40%*
Difference from No-Action	**0.00**	**0.00**	**(80,035.74)**	**(100,256.06)**	**(1,109,653.28)**	**(1,103,550.04)**
Percent Change	*0.00%*	*0.00%*	*-0.04%*	*-0.04%*	*-0.53%*	*-0.44%*

Note:
* All numbers in millions of BTUs.
Sources: Parsons Corp., VTA, 2003.

Table 4.8-4: Net Annual Direct and Total Energy Use by Mode by Alternative (2025)*

Mode	No-Action		Baseline		BART	
	Direct BTUs	Total BTUs	Direct BTUs	Total BTUs	Direct BTUs	Total BTUs
Bus	687,440	790,548	780,855	897,974	715,176	822,444
LRT	171,135	400,784	171,135	400,784	171,135	400,784
BART	1,775,022	4,156,960	1,775,022	4,156,960	2,042,818	4,784,116
Commuter Rail	222,386	255,743	222,386	255,743	222,386	255,743
Subtotal	*2,855,983*	*5,604,035*	*2,949,398*	*5,711,461*	*3,151,515*	*6,263,087*
Auto/Truck	206,910,854	248,303,735	206,746,745	248,106,795	205,575,391	246,701,110
Total	**209,766,837**	**253,907,770**	**209,696,143**	**253,818,256**	**208,726,906**	**252,964,197**
Difference from Baseline	**70,694**	**89,514**	**0.0**	**0.0**	**(969,237)**	**(854,059)**
Percent Change	*0.03%*	*0.04%*	*0.00%*	*0.00%*	*-0.46%*	*-0.34%*
Difference from No-Action	**0**	**0**	**(70,694)**	**(89,514)**	**(1,039,931)**	**(943,573)**
Percent Change	*0.00%*	*0.00%*	*-0.03%*	*-0.04%*	*-0.50%*	*-0.37%*

Note:
* All numbers in millions of BTUs.
Sources: Parsons, VTA, 2003.

Electricity Generation Capacity. The rate of electricity use by the BART Alternative during peak-periods of electricity demand (3:00 to 7:00 p.m.) would be on the order of 11 MW. By comparison, this is a rate equivalent of approximately 11,000 homes. As a percentage of the furthest available projection of surplus, 11 MW is on the order of 0.2% of the 2008 surplus. In terms of the percentage of expected demand rates, 11 MW is on the order of 0.001% of the projected total 2025 California electricity demand. The MOS Scenarios would use slightly less peak period energy since the number of cars per train would be less than for the BART Alternative. While the BART Alternative, as well as the MOS scenarios, would increase the peak demand on the power generation system, the impact would be limited due to surplus capacity and the relatively small percentage of that surplus that the additional load from the project represents.

Transmission Capacity. Improvements to transmission capacity are planned and being implemented (e.g., Path 15 improvements). Therefore, the increased demand on the Cal ISO electrical transmission grid would not have an adverse impact.

4.8.3.2 Design Requirements and Best Management Practices

Baseline and BART Alternative

For the Baseline Alternative or BART Alternative, as well as the MOS scenarios, facilities and equipment will be designed and specified to ensure energy efficiency, thereby helping to reduce the long-term energy requirements and the operating costs of proposed transit system improvements.

4.8.3.3 Mitigation Measures

No-Action Alternative

Transportation modes in 2025 under the No-Action Alternative would not change substantially compared to existing conditions. However, projects planned under the No-Action Alternative would undergo separate environmental review to define energy impacts and to determine appropriate mitigation measures.

Baseline and BART Alternative

Because the Baseline Alternative and the BART Alternative, including the MOS scenarios, are estimated to generate overall energy savings compared to the No-Action Alternative, energy impacts are not considered adverse and no energy mitigation measures are warranted.

The impacts on electricity generation and transmission capacity are not anticipated to be adverse, so mitigation measures would not be required.

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