

APPENDIX I: ENERGY AND GREENHOUSE GAS TECHNICAL TABLES

- I.1 Energy Detail Tables**
- I.2 Energy and Greenhouse Gas Calculations**

I.1 Energy and Greenhouse Gas Technical Tables – Energy Detail Tables

APPENDIX I.1 ENERGY DETAIL TABLES

Tables 1 through 20 below provide detailed estimates for change in energy use from the operation of the Proposed Project and Build Alternatives in 2025 and 2040 under Project Conditions, followed by 2025 and 2040 under Cumulative Conditions. Information is provided in kilowatt-hours (kWh) of electricity, gallons of diesel, gallons of gasoline, and total energy in million British thermal units (MMBTU).

TABLE 1 2025 CONVENTIONAL BART PROJECT – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	13,060,256	-	-	44,588
Bus operations	-	120,505	-	16,689
<i>Station and Maintenance Operations</i>				
BART car maintenance	1,977,431	-	-	6,751
DMU/EMU car maintenance	-	-	-	-
Station electricity	2,847,609	-	-	9,722
Emergency generators	-	5,821	-	806
Water and wastewater	29,696	-	-	101
Employee Shuttle Vans	-	401	-	56
Maintenance trucks	-	442	-	61
Electric forklifts	65,650	-	-	224
<i>Subtotal Sources</i>	17,980,642	127,169	0	78,998
Reductions				
Passenger vehicles (reduced VMT)	-699,054	-8,038	-1,152,834	-146,843
Solar photovoltaic electricity generation	-1,557,588	-	-	-5,318
<i>Subtotal Reductions</i>	-2,256,642	-8,038	-1,152,834	-152,161
Total	15,724,000	119,131	-1,152,834	-73,163

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

“-” = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 2 2025 DMU ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	2,520,059	-	-	8,603
DMU operations	757,935	281,445	-	41,565
EMU operations	-	-	-	-
Bus operations	-	120,505	-	16,689
<i>Station and Maintenance Operations</i>				
BART car maintenance	381,558	-	-	1,303
DMU/EMU car maintenance	530,166	-	-	1,810
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	442	-	61
Electric forklifts	65,650	-	-	224
Subtotal Sources	7,122,654	408,213	0	80,850
Reductions				
Passenger vehicles (reduced VMT)	-522,286	-6,005	-861,318	-109,711
Solar photovoltaic electricity generation	-1,557,588	-	-	-5,318
Subtotal Reductions	-2,079,874	-6,005	-861,318	-115,029
Total	5,042,781	402,207	-861,318	-34,179

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.
“-” = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 3 2025 EMU OPTION CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	2,520,059	-	-	8,603
EMU operations	3,872,106	-	-	13,219
Bus operations	-	120,505	-	16,689
<i>Station and Maintenance Operations</i>				
BART car maintenance	381,558	-	-	1,303
DMU/EMU car maintenance	530,166	-	-	1,810
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	442	-	61
Electric forklifts	65,650	-	-	224
Subtotal Sources	10,236,825	126,768	0	52,504
Reductions				
Passenger vehicles (reduced VMT)	-522,286	-6,005	-861,318	-109,711
Solar photovoltaic electricity generation	-1,557,588	-	-	-5,318
Subtotal Reductions	-2,079,874	-6,005	-861,318	-115,029
Total	8,156,952	120,762	-861,318	-62,524

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 4 2025 EXPRESS BUS/BRT ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	504,396	-	-	1,722
EMU operations	-	-	-	-
Bus operations	-	147,684	-	20,453
<i>Station and Maintenance Operations</i>				
BART car maintenance	76,370	-	-	261
Water and wastewater	7,177	-	-	25
Subtotal Sources	587,942	147,684	0	22,461
Reductions				
Passenger vehicles (reduced VMT)	-244,108	-2,807	-402,567	-51,277
Subtotal Reductions	-244,108	-2,807	-402,567	-51,277
Total	343,834	144,877	-402,567	-28,817

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.
“-” = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 5 2025 ENHANCED BUS ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
Bus operations	-	132,202	-	18,309
<i>Station and Maintenance Operations</i>				
Water and wastewater	3,727	-	-	13
Subtotal Sources	3,727	132,202	0	18,322
Reductions				
Passenger vehicles (reduced VMT)	-1,383	-16	-2,281	-291
Subtotal Reductions	-1,383	-16	-2,281	-291
Total	2,344	132,186	-2,281	18,031

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.
“-” = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 6 2040 CONVENTIONAL BART PROJECT – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	16,064,227	-	-	54,843
Bus operations	-	105,934	-	14,671
<i>Station and Maintenance Operations</i>				
BART car maintenance	2,432,257	-	-	8,304
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	29,696	-	-	101
Employee Shuttle Vans	-	378	-	52
Maintenance trucks	-	416	-	58
Electric forklifts	65,650	-	-	224
<i>Subtotal Sources</i>	21,439,439	112,549	0	88,781
Reductions				
Passenger vehicles (reduced VMT)	-2,621,456	-12,537	-1,643,157	-214,996
Solar photovoltaic electricity generation	-1,339,617	-	-	-4,573
<i>Subtotal Reductions</i>	-3,961,072	-12,537	-1,643,157	-219,569
Total	17,478,366	100,011	-1,643,157	-130,788

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 7 2040 DMU ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	5,186,786	-	-	17,708
DMU operations	823,155	313,236	-	46,190
Bus operations	-	105,934	-	14,671
<i>Station and Maintenance Operations</i>				
BART car maintenance	785,322	-	-	2,681
DMU/EMU car maintenance	590,052	-	-	2,014
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	416	-	58
Electric forklifts	65,650	-	-	224
Subtotal Sources	10,318,252	425,407	0	94,141
Reductions				
Passenger vehicles (reduced VMT)	-1,518,992	-7,265	-952,121	-124,579
Solar photovoltaic electricity generation	-1,339,617	-	-	-4,573
Subtotal Reductions	-2,858,609	-7,265	-952,121	-129,152
Total	7,459,644	418,142	-952,121	-35,011

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 8 2040 EMU OPTION – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	5,186,786	-	-	17,708
DMU operations	-	-	-	-
EMU operations	4,295,131	-	-	14,664
Bus operations	-	105,934	-	14,671
<i>Station and Maintenance Operations</i>				
BART car maintenance	785,322	-	-	2,681
DMU/EMU car maintenance	590,052	-	-	2,014
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	416	-	58
Electric forklifts	65,650	-	-	224
Subtotal Sources	13,790,228	112,171	0	62,615
Reductions				
Passenger vehicles (reduced VMT)	-1,518,992	-7,265	-952,121	-124,579
Solar photovoltaic electricity generation	-1,339,617	-	-	-4,573
Subtotal Reductions	-2,858,609	-7,265	-952,121	-129,152
Total	10,931,620	104,906	-952,121	-66,538

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.
 "-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 9 2040 EXPRESS BUS/BRT ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	2,163,762	-	-	7,387
Bus operations	-	129,827	-	17,980
<i>Station and Maintenance Operations</i>				
BART car maintenance	327,612	-	-	1,118
Water and wastewater	7,177	-	-	25
Subtotal Sources	2,498,551	129,827	0	26,510
Reductions				
Passenger vehicles (reduced VMT)	-1,015,838	-4,858	-636,738	-83,313
Subtotal Reductions	-1,015,838	-4,858	-636,738	-83,313
Total	1,482,713	124,968	-636,738	-56,803

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 10 2040 ENHANCED BUS ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
Bus operations	-	116,216	-	16,095
<i>Station and Maintenance Operations</i>				
Water and wastewater	3,727	-	-	13
Subtotal Sources	3,727	116,216	0	16,108
Reductions				
Passenger vehicles (reduced VMT)	-96,741	-463	-60,638	-7,934
Solar photovoltaic electricity generation	-	-	-	-
Subtotal Reductions	-96,741	-463	-60,638	-7,934
Total	-93,014	115,754	-60,638	8,173

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 11 2025 CUMULATIVE CONDITIONS – CONVENTIONAL BART PROJECT – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	13,060,256	-	-	44,588
Bus operations	-	120,505	-	16,689
<i>Station and Maintenance Operations</i>				
BART car maintenance	1,977,431	-	-	6,751
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	29,696	-	-	101
Employee Shuttle Vans	-	401	-	56
Maintenance trucks	-	442	-	61
Electric forklifts	65,650	-	-	224
Subtotal Sources	17,980,642	127,169	0	78,998
Reductions				
Passenger vehicles (reduced VMT)	-596,686	-6,861	-984,015	-125,339
Solar photovoltaic electricity generation	-1,557,588	-	-	-5,318
Subtotal Reductions	-2,154,274	-6,861	-984,015	-130,657
Total	15,826,368	120,308	-984,015	-51,660

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 12 2025 CUMULATIVE CONDITIONS – DMU ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	2,520,059	-	-	8,603
DMU operations	757,935	281,445	-	41,565
Bus operations	-	120,505	-	16,689
<i>Station and Maintenance Operations</i>				
BART car maintenance	381,558	-	-	1,303
DMU/EMU car maintenance	530,166	-	-	1,810
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	442	-	61
Electric forklifts	65,650	-	-	224
Subtotal Sources	7,122,654	408,213	0	80,850
Reductions				
Passenger vehicles (reduced VMT)	-399,471	-4,593	-658,780	-83,913
Solar photovoltaic electricity generation	-1,557,588	-	-	-5,318
Subtotal Reductions	-1,957,059	-4,593	-658,780	-89,231
Total	5,165,596	403,619	-658,780	-8,380

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

**TABLE 13 2025 CUMULATIVE CONDITIONS – EMU OPTION – CHANGE IN ANNUAL ENERGY USE
 DETAILS**

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	2,520,059	-	-	8,603
EMU operations	3,872,106	-	-	13,219
Bus operations	-	120,505	-	16,689
<i>Station and Maintenance Operations</i>				
BART car maintenance	381,558	-	-	1,303
DMU/EMU car maintenance	530,166	-	-	1,810
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	442	-	61
Electric forklifts	65,650	-	-	224
Subtotal Sources	10,236,825	126,768	0	52,504
Reductions				
Passenger vehicles (reduced VMT)	-399,471	-4,593	-658,780	-83,913
Solar photovoltaic electricity generation	-1,557,588	-	-	-5,318
Subtotal Reductions	-1,957,059	-4,593	-658,780	-89,231
Total	8,279,767	122,174	-658,780	-36,726

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 14 2025 CUMULATIVE CONDITIONS – EXPRESS BUS/BRT ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	504,396	-	-	1,722
Bus operations	-	147,684	-	20,453
<i>Station and Maintenance Operations</i>				
BART car maintenance	76,370	-	-	261
Water and wastewater	7,177	-	-	25
Subtotal Sources	587,942	147,684	0	22,461
Reductions				
Passenger vehicles (reduced VMT)	-356,551	-4,100	-588,000	-74,897
Solar photovoltaic electricity generation	-	-	-	-
Subtotal Reductions	-356,551	-4,100	-588,000	-74,897
Total	231,392	143,584	-588,000	-52,437

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 15 2025 CUMULATIVE CONDITIONS – ENHANCED BUS ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
Bus operations	-	132,202	-	18,309
<i>Station and Maintenance Operations</i>				
	0	0	0	
Water and wastewater	3,727	-	-	13
Subtotal Sources	3,727	132,202	0	18,322
Reductions				
Passenger vehicles (reduced VMT)	-159,107	-1,829	-262,388	-33,421
Subtotal Reductions	-159,107	-1,829	-262,388	-33,421
Total	-155,380	130,373	-262,388	-15,101

Notes: Energy use is shown as the change between the 2025 No Project Conditions and the 2025 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 16 2040 CUMULATIVE CONDITIONS – CONVENTIONAL BART PROJECT – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	16,064,227	-	-	54,843
Bus operations	-	122,587	-	14,671
<i>Station and Maintenance Operations</i>				
BART car maintenance	2,432,257	-	-	8,304
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	4,109	-	806
Water and wastewater	17,278	-	-	101
Employee Shuttle Vans	-	378	-	52
Maintenance trucks	-	416	-	58
Electric forklifts	65,650	-	-	224
Subtotal Sources	21,439,439	127,490	0	88,781
Reductions				
Passenger vehicles (reduced VMT)	-2,927,763	-14,002	-1,835,154	-240,117
Solar photovoltaic electricity generation	-1,339,617	-	-	-4,573
Subtotal Reductions	-4,267,380	-14,002	-1,835,154	-244,690
Total	17,172,059	133,487	-1,835,154	-155,910

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 17 2040 CUMULATIVE CONDITIONS – DMU ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	5,186,786	-	-	17,708
DMU operations	823,155	313,236	-	46,190
Bus operations	-	105,934	-	14,671
<i>Station and Maintenance Operations</i>				
BART car maintenance	785,322	-	-	2,681
DMU/EMU car maintenance	590,052	-	-	2,014
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	416	-	58
Electric forklifts	65,650	-	-	224
<i>Subtotal Sources</i>	<i>10,318,252</i>	<i>425,407</i>	<i>0</i>	<i>94,141</i>
Reductions				
Passenger vehicles (reduced VMT)	-1,774,098	-8,485	-1,112,024	-145,501
Solar photovoltaic electricity generation	-1,339,617	-	-	-4,573
<i>Subtotal Reductions</i>	<i>-3,113,714</i>	<i>-8,485</i>	<i>-1,112,024</i>	<i>-150,074</i>
Total	7,204,539	416,922	-1,112,024	-55,933

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

**TABLE 18 2040 CUMULATIVE CONDITIONS – EMU OPTION – CHANGE IN ANNUAL ENERGY USE
DETAILS**

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	5,186,786	-	-	17,708
DMU operations	-	-	-	-
EMU operations	4,295,131	-	-	14,664
Bus operations	-	105,934	-	14,671
<i>Station and Maintenance Operations</i>				
BART car maintenance	785,322	-	-	2,681
DMU/EMU car maintenance	590,052	-	-	2,014
Station electricity	2,847,609	-	-	9,722
Emergency generator	-	5,821	-	806
Water and wastewater	19,678	-	-	67
Maintenance trucks	-	416	-	58
Electric forklifts	65,650	-	-	224
Subtotal Sources	13,790,228	112,171	0	62,615
Reductions				
Passenger vehicles (reduced VMT)	-1,774,098	-8,485	-1,112,024	-145,501
Solar photovoltaic electricity generation	-1,339,617	-	-	-4,573
Subtotal Reductions	-3,113,714	-8,485	-1,112,024	-150,074
Total	10,676,515	103,686	-1,112,024	-87,460

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.

"-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 19 2040 CUMULATIVE CONDITIONS – EXPRESS BUS/BRT ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
BART operations	2,163,762	-	-	7,387
Bus operations	-	129,827	-	17,980
<i>Station and Maintenance Operations</i>				
BART car maintenance	327,612	-	-	1,118
Water and wastewater	7,177	-	-	25
Subtotal Sources	2,498,551	129,827	0	26,510
Reductions				
Passenger vehicles (reduced VMT)	-1,232,786	-5,896	-772,724	-101,106
Subtotal Reductions	-1,232,786	-5,896	-772,724	-101,106
Total	1,265,765	123,931	-772,724	-74,596

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.
 "-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

TABLE 20 2040 CUMULATIVE CONDITIONS – ENHANCED BUS ALTERNATIVE – CHANGE IN ANNUAL ENERGY USE DETAILS

Energy Use Component	Electricity (kWh)	Diesel (Gallons)	Gasoline (Gallons)	Total Energy Use (MMBTU)
Sources				
<i>Transit Operations</i>				
Bus operations	-	116,216	-	16,095
<i>Station and Maintenance Operations</i>				
Water and wastewater	3,727	-	-	13
Subtotal Sources	3,727	116,216	0	16,108
Reductions				
Passenger vehicles (reduced VMT)	-313,929	-1,501	-196,774	-25,747
Subtotal Reductions	-313,929	-1,501	-196,774	-25,747
Total	-310,202	114,715	-196,774	-9,639

Notes: Energy use is shown as the change between the 2040 No Project Conditions and the 2040 Cumulative Project Conditions. Positive values represent an increase in energy use and negative values represent a decrease in energy use.
 "-" = not applicable; VMT = vehicle miles traveled; kWh = kilowatt hours; MMBTU = 1 million British thermal units.

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I.2 Energy and Greenhouse Gas Technical Tables – Energy and Greenhouse Gas Calculations

APPENDIX I.2 ENERGY AND GREENHOUSE GAS CALCULATIONS

**Table E-1a
Energy Use from Project Construction
BART to Livermore Extension Project
Livermore, California**

Source		Energy Use			
		BART	DMU/EMU	Express Bus/BRT	Enhanced Bus
Diesel (gal)	On-Road Vehicles	482,395	572,498	145,425	15,652
	Off-Road Equipment	568,454	304,547	75,726	9,811
Gasoline (gal)	On-Road Vehicles	107,641	109,991	102,552	3,979
Electricity (kWh)	On-Road Vehicles	10,293	10,293	10,913	383

Notes

On-road mobile source fuel use based on vehicle miles traveled (VMT) for all years of construction and fleet-average fuel consumption in gallons per mile from EMFAC2014 for 2020 in Alameda County. Electricity demand based on VMT and calculated average electric vehicle fuel economy for 2015 models (in kWh per mile) from the DOE Fuel Economy Guide.

Off-road mobile source fuel usage based on a fuel usage rate of 0.05 gallons of diesel per horsepower (hp)-hour, consistent with diesel conversion factors given in USEPA AP-42 Table 3.4.1.

Abbreviations

BART: Bay Area Rapid Transit	gal: gallon
BRT: Bus Rapid Transit	hp: horsepower
DMU: Diesel Multiple Unit	kWh: kilowatt-hour
DOE: United States Department of Energy	USEPA: United States Environmental Protection Agency
EMFAC2014: California Air Resources Board Emission Factor mod VMT: vehicle miles traveled	
EMU: Electric Multiple Unit	

References:

DOE. 2016. Fuel Economy Guide, Model Year 2015. Electric Vehicles. Available online at: <http://www.fueleconomy.gov/feg/printGuides.shtml>. Accessed January 2016.

USEPA. 1996. AP 42. Compilation of Air Pollutant Emission Factors, Volume 1. Fifth Edition. Chapter 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines. Available online at: <http://www.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf>. Accessed January 2016

Table E-1b
Energy Use from Project Construction (MMBtu)
BART to Livermore Extension Project
Livermore, California

Source		Energy Use (MMBtu)			
		BART	DMU/EMU	Express Bus/BRT	Enhanced Bus
Diesel	On-Road Vehicles	66,807	79,285	20,140	2,168
	Off-Road Equipment	78,725	42,177	10,487	1,359
Gasoline	On-Road Vehicles	13,384	13,676	12,751	495
Electricity	On-Road Vehicles	106.4	106.4	112.8	4.0
Total		159,023	135,245	43,491	4,025

Notes

¹ Energy use from Table E-1a was converted to units of MMBtu based on energy content to allow for the comparison of total energy use across Alternatives.

Abbreviations

BART: Bay Area Rapid Transit
 BRT: Bus Rapid Transit
 DMU: Diesel Multiple Unit
 EMU: Electric Multiple Unit
 MMBtu: million British thermal units

References:

DOE. 2014. Fuel Properties Comparison. Available online at:
http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf. Accessed October 2016.

Table E-2a
Energy Use from Project Operations
BART to Livermore Extension Project
Livermore, California

Energy Source		Scenario ¹	Year	Conventional BART	DMU Alternative	EMU Alternative	Express Bus/BRT Alternative	Enhanced Bus Alternative
Electricity (kWh/yr)	Passenger Vehicles ²	Project	2025	-699,054	-522,286	-522,286	-244,108	-1,383
			2040	-2,621,456	-1,518,992	-1,518,992	-1,015,838	-96,741
	BART Traction ³	Project and Cumulative	2025	-596,686	-399,471	-399,471	-356,551	-159,107
			2040	-2,927,763	-1,774,098	-1,774,098	-1,232,786	-313,929
	DMU Idling ⁴	Project and Cumulative	2025	13,060,256	2,520,059	2,520,059	504,396	-
			2040	16,064,227	5,186,786	5,186,786	2,163,762	-
	EMU Traction and Idling ⁵	Project and Cumulative	2025	-	757,935	-	-	-
			2040	-	823,155	-	-	-
	Building and Parking Electricity at Isabel	Project and Cumulative	2025	-	-	3,872,106	-	-
			2040	-	-	4,295,131	-	-
	Maintenance of BART Cars ⁷	Project and Cumulative	2025 and	2,847,609	2,847,609	2,847,609	-	-
			2025	1,977,431	381,558	381,558	76,370	-
	Maintenance of DMU/EMU Cars ⁷	Project and Cumulative	2025	2,432,257	785,322	785,322	327,612	-
			2040	-	530,166	530,166	-	-
	Water and Wastewater ⁸	Project and Cumulative	2025	-	590,052	590,052	-	-
			2040	-	590,052	590,052	-	-
Forklifts ⁹	Project and Cumulative	2025 and	29,696	19,678	19,678	7,177	3,727	
		2025 and	65,650	65,650	65,650	-	-	
Solar PV at Isabel Station ¹⁰	Project and Cumulative	2025	-1,557,588	-1,557,588	-1,557,588	-	-	
		2040	-1,339,617	-1,339,617	-1,339,617	-	-	
Total	Project	2025	15,724,000	5,042,781	8,156,952	343,834	2,344	
		2040	17,478,366	7,459,644	10,931,620	1,482,713	-93,014	
	Cumulative	2025	15,826,368	5,165,596	8,279,767	231,392	-155,380	
		2040	17,172,059	7,204,539	10,676,515	1,265,765	-310,202	
Diesel (gal/yr)	Passenger Vehicles ²	Project	2025	-8,038	-6,005	-6,005	-2,807	-16
			2040	-12,537	-7,265	-7,265	-4,858	-463
	Buses ²	Project and Cumulative	2025	-6,861	-4,593	-4,593	-4,100	-1,829
			2040	-14,002	-8,485	-8,485	-5,896	-1,501
	DMU Engine ¹¹	Project and Cumulative	2025	120,505	120,505	120,505	147,684	132,202
			2040	105,934	105,934	105,934	129,827	116,216
	Emergency Generator (Isabel Station) ¹²	Project and Cumulative	2025	-	281,445	-	-	-
			2040	-	313,236	-	-	-
	Emergency Generator (Maintenance Facility) ¹²	Project and Cumulative	2025 and	4,109	4,109	4,109	-	-
			2025 and	1,712	1,712	1,712	-	-
	Maintenance Facility Shuttle Vans ^{2,13}	Project and Cumulative	2025	401	-	-	-	-
			2040	378	-	-	-	-
	Off-Road Trucks ^{2,14}	Project and Cumulative	2025	442	442	442	-	-
			2040	416	416	416	-	-
	Total	Project	2025	119,131	402,207	120,762	144,877	132,186
			2040	100,011	418,142	104,906	124,968	115,754
Cumulative		2025	120,308	403,619	122,174	143,584	130,373	
		2040	98,546	416,922	103,686	123,931	114,715	

Energy Source		Scenario ¹	Year	Conventional BART	DMU Alternative	EMU Alternative	Express Bus/BRT Alternative	Enhanced Bus Alternative
Gasoline (gal/yr)	Passenger Vehicles ²	Project	2025	-1,152,834	-861,318	-861,318	-402,567	-2,281
			2040	-1,643,157	-952,121	-952,121	-636,738	-60,638
		Cumulative	2025	-984,015	-658,780	-658,780	-588,000	-262,388
			2040	-1,835,154	-1,112,024	-1,112,024	-772,724	-196,774
	Total	Project	2025	-1,152,834	-861,318	-861,318	-402,567	-2,281
			2040	-1,643,157	-952,121	-952,121	-636,738	-60,638
		Cumulative	2025	-984,015	-658,780	-658,780	-588,000	-262,388
			2040	-1,835,154	-1,112,024	-1,112,024	-772,724	-196,774

Notes

- ¹ Project and cumulative scenarios for each alternative only differ in the level of on-road passenger traffic.
- ² Vehicle gasoline and diesel demand for passenger vehicles, off-road trucks, and buses is derived from EMFAC2014 daily fuel use in Alameda County for operational years 2025 and 2040.
- ³ BART traction electricity demand calculated from annual total car-miles traveled and an electricity demand factor of 4.51 kWh/car-mile (based on 2006 system-wide traction electricity demand).
- ⁴ DMU idling electricity calculated based on an assumption of 12 min of idling per roundtrip. An electricity demand factor of 0.88 kWh/idle-minute (2008 eBART Phase I Project to Hillcrest Terminal DMU and LRV Comparison) was modified to account for the Project-specific number of cars per train.
- ⁵ EMU traction electricity calculated from annual revenue DMU car-miles and roundtrips. EMU idling electricity calculated based on an assumption of 12 min of idling per roundtrip.
- ⁶ Building electricity consumption at the new Isabel Station was assumed to be similar to the electricity use at the East Dublin/Pleasanton Station and Station Parking Lot. The value shown here represents a three-year annual average from 2012-2014. Electricity with losses were conservatively included.
- ⁷ Additional electricity use is anticipated from the maintenance of BART and DMU/EMU cars. A maintenance factor of 7,060 BTU/mile was obtained from Caltrans Energy and Transportation Systems, Table E-13 (1983) and applied to annual car-miles.
- ⁸ Water consumption includes use at the Dublin/Pleasanton and Isabel stations, the Maintenance Facility, and wayside facilities. Estimates of consumption are primarily based on historical usage at existing and comparable BART facilities, scaled for anticipated level of activity. Energy use consists of upstream electricity to supply, treat, and distribute water and downstream electricity to treat wastewater.
- ⁹ Two electric forklifts will be used at the maintenance yard for the Conventional BART and DMU/EMU alternatives. Horsepower and load factor are industrial averages and CalEEMod defaults, respectively. It is assumed that the forklifts will operate 365 days a year for 8 hours a day.
- ¹⁰ A solar PV capacity of 1,000 kW is assumed for the Isabel Station in 2025, with a 1% annual degradation in performance for every year thereafter. Electricity generation was estimated using the National Renewable Energy Laboratory's PVWatts calculator, available online at: <http://pvwatts.nrel.gov/pvwatts.php>. Electricity generation shown is for a roof-array with default assumptions and weather conditions typical of Livermore, California.
- ¹¹ DMU diesel demand is calculated from annual revenue DMU car-miles. A fuel use rate of 0.725 gallons diesel/mile (2008 East Contra Costa BART Extension Draft EIR) was modified to account for the Project-specific number of cars per train.
- ¹² One 2,500-kW emergency generator will be located at Isabel Station and one 500-kW emergency generator will be located at the Maintenance Facility. It is assumed that operation for routine maintenance and testing will not exceed 24 hours per year for the Isabel Station generator and 50 hours per year for the Maintenance Facility generator.
- ¹³ One shuttle van will be used at the maintenance yard for the Conventional BART and DMU/EMU alternatives. It is assumed that the vans will travel 20 miles per day (7,300 annual VMT) and idle for 40 minutes per day.
- ¹⁴ Two off-road trucks will be used at the maintenance yard for the Conventional BART and DMU/EMU alternatives. It is assumed that the trucks will travel 11 miles per day (8,030 annual VMT) and idle for 10 minutes per day, per vehicle.

Abbreviations

BART: Bay Area Rapid Transit	gal: gallon
BRT: Bus Rapid Transit	kWh: kilowatt-hour
CalEEMod®: California Emissions Estimator Model	PV: photovoltaic
DMU: Diesel Multiple Unit	USEPA: United States Environmental Protection Agency
DOE: United States Department of Energy	VMT: vehicle miles traveled
EMFAC2014: California Air Resources Board Emission FACTor model	yr: year
EMU: Electric Multiple Unit	

Table E-2b
Energy Use from Project Operations (MMBtu)
BART to Livermore Extension Project
Livermore, California

Energy Source		Scenario ¹	Year	Energy Use (MMBtu)				
				Conventional BART	DMU Alternative	EMU Alternative	Express Bus/BRT Alternative	Enhanced Bus Alternative
Electricity	Passenger Vehicles	Project	2025	-2,387	-1,783	-1,783	-833	-5
			2040	-8,950	-5,186	-5,186	-3,468	-330
		Cumulative	2025	-2,037	-1,364	-1,364	-1,217	-543
			2040	-9,995	-6,057	-6,057	-4,209	-1,072
	BART Traction	Project and Cumulative	2025	44,588	8,603	8,603	1,722	-
			2040	54,843	17,708	17,708	7,387	-
	DMU Idling Electricity Use	Project and Cumulative	2025	-	2,588	-	-	-
			2040	-	2,810	-	-	-
	EMU Traction	Project and Cumulative	2025	-	-	13,219	-	-
			2040	-	-	14,664	-	-
	Building and Parking Electricity at Isabel Station	Project and Cumulative	2025 and 2040	9,722	9,722	9,722	-	-
	Maintenance of BART Cars	Project and Cumulative	2025	6,751	1,303	1,303	261	-
			2040	8,304	2,681	2,681	1,118	-
	Maintenance of DMU/EMU Cars	Project and Cumulative	2025	-	1,810	1,810	-	-
			2040	-	2,014	2,014	-	-
	Water and Wastewater	Project and Cumulative	2025 and 2040	101	67	67	25	13
	Forklifts	Project and Cumulative	2025 and 2040	224	224	224	-	-
	Solar PV at Isabel Station	Project and Cumulative	2025	-5,318	-5,318	-5,318	-	-
			2040	-4,573	-4,573	-4,573	-	-
	Total	Project	2025	53,682	17,216	27,848	1,174	8
2040			59,671	25,467	37,321	5,062	-318	
Cumulative		2025	54,031	17,635	28,267	790	-530	
		2040	58,625	24,596	36,450	4,321	-1,059	

Table E-2b
Energy Use from Project Operations (MMBtu)
BART to Livermore Extension Project
Livermore, California

Energy Source		Scenario ¹	Year	Energy Use (MMBtu)				
				Conventional BART	DMU Alternative	EMU Alternative	Express Bus/BRT Alternative	Enhanced Bus Alternative
Diesel	Passenger Vehicles	Project	2025	-1,113	-832	-832	-389	-2
			2040	-1,736	-1,006	-1,006	-673	-64
		Cumulative	2025	-950	-636	-636	-568	-253
			2040	-1,939	-1,175	-1,175	-817	-208
	Buses	Project and Cumulative	2025	16,689	16,689	16,689	20,453	18,309
			2040	14,671	14,671	14,671	17,980	16,095
	DMU Engine	Project and Cumulative	2025	-	38,977	-	-	-
			2040	-	43,380	-	-	-
	Emergency Generator (Isabel Station)	Project and Cumulative	2025 and 2040	569	569	569	-	-
	Emergency Generator (Maintenance Facility)	Project and Cumulative	2025 and 2040	237	237	237	-	-
	Maintenance Facility Shuttle Vans	Project and Cumulative	2025	56	-	-	-	-
			2040	52	-	-	-	-
	Off-Road Maintenance Trucks	Project and Cumulative	2025	61	61	61	-	-
			2040	58	58	58	-	-
	Total	Project	2025	16,498	55,702	16,724	20,064	18,306
			2040	13,851	57,909	14,528	17,307	16,031
		Cumulative	2025	16,661	55,897	16,920	19,885	18,055
2040			13,648	57,740	14,359	17,163	15,887	

Table E-2b
Energy Use from Project Operations (MMBtu)
BART to Livermore Extension Project
Livermore, California

Energy Source		Scenario ¹	Year	Energy Use (MMBtu)				
				Conventional BART	DMU Alternative	EMU Alternative	Express Bus/BRT Alternative	Enhanced Bus Alternative
Gasoline	Passenger Vehicles	Project	2025	-143,343	-107,096	-107,096	-50,055	-284
			2040	-204,310	-118,387	-118,387	-79,172	-7,540
		Cumulative	2025	-122,352	-81,913	-81,913	-73,112	-32,625
			2040	-228,183	-138,269	-138,269	-96,080	-24,467
	Total	Project	2025	-143,343	-107,096	-107,096	-50,055	-284
			2040	-204,310	-118,387	-118,387	-79,172	-7,540
		Cumulative	2025	-122,352	-81,913	-81,913	-73,112	-32,625
			2040	-228,183	-138,269	-138,269	-96,080	-24,467
Total	Project	2025	-73,163	-34,179	-62,524	-28,817	18,031	
		2040	-130,788	-35,011	-66,538	-56,803	8,173	
	Cumulative	2025	-51,660	-8,380	-36,726	-52,437	-15,101	
		2040	-155,910	-55,933	-87,460	-74,596	-9,639	

Notes

¹ Energy use from Table E-2a was converted to units of MMBtu based on energy content to allow for the comparison of total energy use across Alternatives. Conversion factors from fuel or electricity to BTU are from the U.S. Department of Energy "Fuel Properties Comparison" (2014). Conversion factors of 3,414 Btu/kWh of electricity, 124,240 BTU/gal of gasoline, and 138,490 BTU/gal of diesel were used for this purpose.

Abbreviations

BART: Bay Area Rapid Transit	gal - gallon
BRT: Bus Rapid Transit	EMU: Electric Multiple Unit
Btu - British thermal units	kWh - kilowatt-hour
DMU: Diesel Multiple Unit	MMBtu: million British thermal units
DOE: United States Department of Energy	yr: year

References:

DOE. 2014. Fuel Properties Comparison. Available online at: http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf. Accessed October 2016.

Table GHG-1
One-Time GHG Emissions from Project Construction
BART to Livermore Extension Project
Livermore, California

Emissions Type	GHG Emissions (MT CO ₂ e)			
	BART	DMU/EMU	Express Bus/BRT	Enhanced Bus
Off-Road Vehicles	5,337	2,867	706	92
On-Road Vehicles	5,682	6,591	2,118	189
Total One-Time GHG Emissions	11,019	9,458	2,824	281

Notes:

- ¹ Total construction GHG emissions include contributions from off-road equipment activity and on-road traffic. Off-road construction emissions were calculated based on Project-specific equipment list and usage hours and CalEEMod® (version 2013.2.2) default equipment factors (see AQ Technical Appendix Tables 2 and 3). On-road construction emissions calculated based on the total trips and vehicle miles and the EMFAC2014-based emission factors (see AQ Technical Appendix Tables 3 through 6).
- ² Enhanced bus improvements are included for all alternatives. The bus improvements were conservatively approximated by scaling BART emissions, excluding the Maintenance Facility/Yard, by the relative construction durations (i.e., total BART construction emissions*2 months/48 months). For each alternative, the total emissions is equal to the original scenario-specific emissions, plus the additional approximate emissions from bus improvements.
- ³ Global warming potentials are based on Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report.

Abbreviations:

BART: Bay Area Rapid Transit	EMU: Electric Multiple Unit
BRT: Bus Rapid Transit	GHG: greenhouse gas
CO ₂ e: Carbon Dioxide Equivalent	MT: metric ton
DMU: Diesel Multiple Unit	

**Table GHG-2
 Annual Greenhouse Gas Emissions from Project Operations
 BART to Livermore Extension Project
 Livermore, California**

Alternative	Emission Source	Scenario ¹	CO ₂ e (MT/yr) ²		
			2025	2040	
Conventional BART	Passenger Vehicles	Project	-9,616	-13,669	
		Cumulative	-8,232	-15,275	
	Buses	Project and Cumulative	1,251	1,103	
	BART Traction		576	709	
	Station Electricity		126	126	
	BART Car Maintenance		87	107	
	Waste		447	447	
	Emergency Generator (Isabel Station)		42	42	
	Emergency Generator (Maintenance Facility)		18	18	
	Maintenance Facility Shuttle Vans		5	5	
	Off-Road Maintenance Trucks		5	5	
	Electric Forklifts		4	4	
	Water and Wastewater		9	9	
	Solar PV		-69	-59	
	Total		Project	-7,114	-11,154
	Cumulative		-5,730	-12,760	
DMU/EMU Scenario	Passenger Vehicles	Project	-7,191	-7,922	
		Cumulative	-5,521	-9,255	
	BART Traction (to Dublin/Pleasanton)	Project and Cumulative	111	229	
	DMU Engine Exhaust and Idling Electricity Use		2,404	2,675	
	Buses		1,251	1,103	
	EMU Traction		171	190	
	Station Electricity		126	126	
	BART Car Maintenance		17	35	
	DMU/EMU Car Maintenance		23	26	
	Waste		231	231	
	Emergency Generator (Isabel Station)		42	42	
	Emergency Generator (Maintenance Facility)		18	18	
	Off-Road Maintenance Trucks		5	5	
	Electric Forklifts		4	4	
	Water and Wastewater		7	7	
	Solar PV		-69	-59	
	Total DMU		Project	-3,020	-3,482
			Cumulative	-1,350	-4,814
	Total EMU		Project	-5,254	-5,967
	Cumulative	-3,584	-7,300		

**Table GHG-2
 Annual Greenhouse Gas Emissions from Project Operations
 BART to Livermore Extension Project
 Livermore, California**

Alternative	Emission Source	Scenario ¹	CO ₂ e (MT/yr) ²	
			2025	2040
Express Bus/BRT Scenario	Passenger Vehicles	Project	-3,355	-5,302
		Cumulative	-4,901	-6,425
	Buses	Project and Cumulative	1,528	1,347
	BART Traction (to Dublin/Pleasanton)		22	95
	BART Car Maintenance		3	14
	Waste		103	103
	Water and Wastewater		3	3
	Total	Project	-1,695	-3,739
	Cumulative	-3,241	-4,862	
Enhanced Bus Scenario	Passenger Vehicles	Project	-24	-614
		Cumulative	-2,187	-1,634
	Buses	Project and Cumulative	1,369	1,207
	Waste		52	52
	Water and Wastewater		1	1
	Total	Project	1,399	646
	Cumulative	-764	-374	

Notes

- ¹ Project and cumulative scenarios for each alternative only differ in the level of on-road passenger traffic.
- ² The CO₂e emission factor for electricity (97 lb/MWh) was based on BART 2017 electricity portfolio projections, which is assumed to serve as a conservative assumption of electricity intensity for Project years 2025 and 2040. This factor was used in all cases except water treatment electricity, which is presumed to use grid electricity. The grid electricity emission factor (293 lb/MWh) is based on PG&E CO₂ projections for 2020 and CalEEMod® (version 2013.2.2) defaults for CH₄ and N₂O. Global warming potentials from the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report was used in the development of the BART emissions factor, while all other GHG emissions are calculated using the global warming potentials from the Fourth Assessment Report.

Abbreviations

- | | |
|--|---|
| BART: Bay Area Rapid Transit | IPCC: Intergovernmental Panel on Climate Change |
| BRT: Bus Rapid Transit | lb - pound |
| CH ₄ : methane | MT - metric tons |
| CO ₂ : carbon dioxide | MWh - megawatt-hours |
| CO ₂ e: carbon dioxide equivalent | N ₂ O: nitrous oxide |
| DMU: Diesel Multiple Unit | PV - photovoltaic |
| EMU: Electric Multiple Unit | yr: year |
| GHG: greenhouse gas | |