8-4.8 ENERGY

8-4.8.1 Setting

Existing regional energy consumption is discussed in Section 4-8.1 of the Final EIR. Existing annual regional energy consumption remains unchanged.

8-4.8.2 Impact Analysis Methodology and Evaluation Criteria

The impact analysis methodology and evaluation criteria for energy are discussed in Section 4-8.2 of the Final EIR, and it remains unchanged.

8-4.8.3 Impacts

This section assesses the impact of the three Rapid Bus alternatives (RB-3, RB-5, and RB-Network) on transportation-related energy consumption for the region in 2020. The analysis estimates the total amount of energy expected to be consumed by each of the alternatives. The annual direct energy consumption for each alternative is summarized in **Table 8-4.8-1** (Annual Direct Energy Consumption – Year 2020). The change in vehicle miles traveled (VMT) over the No Build Alternative is shown in **Table 8-4.8-2** (Change in VMT of Each Alternative Compared to No Build Alternative). Regional energy consumption for each alternative is compared to the No Build Alternative in **Table 8-4.8-3** (Change in BTU of Each Alignment Compared to No Build Alternative). Similarly, the change in VMT over the Full BRT is shown in **Table 8-4.8-4** (Change in VMT of Each Alternative Compared to Full BRT). Regional energy consumption for each alternative is compared to the Full BRT in **Table 8-4.8-5** (Change in BTU of Each Alignment Compared to Full BRT). **Table 8-4.8-6** (Annual Energy Savings) shows the annual energy savings of each alternative.

Passenger vehicle VMT for the three alternatives would decrease, while CNG bus VMT would increase when compared to the No Build Alternative. The three alternatives are projected to decrease oil consumption when compared to the No Build Alternative, but are projected to increase oil consumption when compared to the Full BRT.

Table 8-4.8-1: Annual Direct Energy Consumption – Year 2020

Vehicle Class	Regional VMT per Year				
	No Build	Full BRT	RB-3	RB-5	RB-Network
Passenger Vehicle	141,666,951,994	141,632,730,366 (lower bound) to 141,641,391,673 (upper bound)	141,644,323,684	141,646,444,293	141,643,876,303
CNG Bus	235,507,550	237,730,082(lower bound) to 237,789,841 (upper bound)	237,066,410	237,089,539	237,258,276
Light or Heavy Rail	9,985,688	10,117,100	10,055,767	9,999,413	10,003,078
Commuter Rail	4,894,378	4,917,686	4,880,681	4,878,397	4,896,822
Energy Consumption (BTU) /a/ (billions)	894,086	893,978 (lower bound) to 894,024 (upper bound)	894,013.9	894,023.4	894,016.6
/a/ One British Thermal Unit (BTU) is the quantity of energy necessary to raise one pound of water one degree Fahrenheit.					

Source: Terry A. Hayes Associates, 2000; see FTA New Start Worksheets.

Table 8-4.8-2: Change in VMT of Each Alternative Compared to No Build Alternative

Vehicle Class	Change in VMT/Year							
	Full BRT vs. No Build		RB-3 vs. No Build		RB-5 vs. No Build		RB-Network vs. No Build	
	Change in VMT/Year	Percent Change	Change in VMT/Year	Percent Change	Change in VMT/Year	Percent Change	Change in VMT/Year	Percent Change
Passenger Vehicle	-34,221,628	-0.02%	-22,628,310	-0.02%	-20,507,700	-0.01%	-23,075,691	-0.02%
CNG Bus	2,222,532	0.94%	1,558,859	0.66%	1,581,989	0.67%	1,750,726	0.74%
Light or Heavy Rail	142,172	1.42%	70,079	0.70%	13,725	0.14%	17,390	0.17%
Commuter Rail	58,512	1.20%	-13,697	-0.28%	-15,981	-0.33%	2,444	-0.05%
VMT = vehicle miles traveled.								

Source: Terry A. Hayes Associates, 2000; see FTA New Start Worksheets.

Table 8-4.8-3: Change in BTU of Each Alignment Compared to No Build Alternative

Vehicle Class	Change in BTU/Year							
	Full BRT vs. No Build		RB-3 vs. No Build		RB-5 vs. No Build		RB-Network vs. No Build	
	BTU/Year (billions)	Percent Change	BTU/Year (billions)	Percent Change	BTU/Year (billions)	Percent Change	BTU/Year (billions)	Percent Change
Passenger Vehicle	-202.5 (lower bound) to -159.3 (upper bound)	-0.02%	-141.0	-0.02%	-127.8	-0.01%	-143.8	-0.02%
CNG Bus	92.6 (lower bound) to 95.1 (upper bound)	0.94% (lower bound) to 0.97% (upper bound)	64.9	0.66%	65.9	0.67%	72.9	0.74%
Light or Heavy Rail	10.2	1.30%	5.4	0.70%	1.1	0.14%	1.4	0.17%
Commuter Rail	2.3	0.48%	-1.4	-0.28%	-1.6	-0.33%	0.2	0.05%

BTU = British Thermal Unit. One BTU is the quantity of energy necessary to raise one pound of water one degree Fahrenheit.

Source: Terry A. Hayes Associates, 2000; see FTA New Start Worksheets.

Table 8-4.8-4: Change in VMT of Each Alignment Compared to Full BRT

Vehicle Class	Change in VMT/Year					
	RB-3 vs. Full BRT		RB-5 vs. Full BRT		RB-Network vs. Full BRT	
	VMT/Year	Percent Change	VMT/Year	Percent Change	VMT/Year	Percent Change
Passenger Vehicle	2,932,011 (upper bound) to 11,593,318 (lower bound)	0.002% (upper bound) to 0.01% (lower bound)	5,052,620 (upper bound) to 13,713,927 (lower bound)	0.004% (upper bound) to 0.01% (lower bound)	2,484,630 (upper bound) to 11,145,937 (lower bound)	0.002% (upper bound) to 0.01% (lower bound)
CNG Bus	-663,672 (lower bound) to -723,431 (upper bound)	-0.28% (lower bound) to -0.30% (upper bound)	-640,543 (lower bound) to -700,302 (upper bound)	-0.27% (lower bound) to -0.29% (upper bound)	-471,806 (lower bound) to -531,565 (upper bound)	-0.20% (lower bound) to –0.22% (upper bound)
Light or Heavy Rail	-61,333	-0.61%	-117,688	-1.16%	-114,023	-1.13%
Commuter Rail	-37,005	-0.75%	-39,289	-0.80%	-20,863	-0.42%

VMT = vehicle miles traveled.

Source: Terry A. Hayes Associates, 2000; see FTA New Start Worksheets.

Table 8-4.8-5: Change in BTU of Each Alignment Compared to Full BRT

Vehicle Class	Change in BTU/Year					
	RB-3 vs. Full BRT		RB-5 vs. Full BRT		RB-Network vs. Full BRT	
	BTU/Year (billions)	Percent Change	BTU/Year (billions)	Percent Change	BTU/Year (billions)	Percent Change
Passenger Vehicle	18.3 (upper bound) to 72.3 (lower bound)	0.002% (upper bound) to 0.01% (lower bound)	31.5 (upper bound) to 85.5 (lower bound)	0.004% (upper bound) to 0.01% (lower bound)	15.5 (upper bound) to 69.5 (lower bound)	0.002% (upper bound) to 0.01% (lower bound)
CNG Bus	-27.6 (lower bound) to -30.1 (upper bound)	-0.28% (lower bound) to -0.30% (upper bound)	-26.7 (lower bound) to -29.2 (upper bound)	-0.27% (lower bound) to -0.29% (upper bound)	-19.7 (lower bound) to -22.1 (upper bound)	-0.20% (lower bound) to 0.22% (upper bound)
Light or Heavy Rail	-4.8 (lower bound) to 5.4 (upper bound)	-0.61% (lower bound) to 0.70% (upper bound)	-9.1 (lower bound) to 1.1 (upper bound)	-1.16% (lower bound) to 0.14% (upper bound)	-8.9 (lower bound) to 1.4 (upper bound)	-1.13% (lower bound) to 0.17% (upper bound)
Commuter Rail	-3.7	-0.75%	-3.9	-0.80%	-2.1	-0.42%

BTU = British Thermal Unit. One BTU is the quantity of energy necessary to raise one pound of water one degree Fahrenheit.

Source: Terry A. Hayes Associates, 2000; see FTA New Start Worksheets.

Table 8-4.8-6: Annual Energy Savings

Alternative	Total BTU Consumed (Billions)	Barrels of Oil	Change in Barrels of Oil Consumed vs. No Build		Changes in Barrels of Oil Consumed vs. Full BRT	
			Barrels	Percent Change	Barrels	Percent Change
No Build	894,024 to 894,086	154,142,065 to 154,152,740	-10,675	-0.01%	-345	-0.0002%
Full BRT	893,978	154,134,809	-18,651	-0.01%	N/A	N/A
RB-3	894,014	154,140,321	-12,419	-0.01%	5,512	0.004%
RB-5	894,023	154,141,972	-10,768	-0.01%	7,163	0.005%
RB-Network	894,017	154,140,791	-11,949	-0.01%	5,982	0.004%

BTU = British thermal unit.

Source: Terry A. Hayes Associates, see FTA New Start Worksheets.

a. RB-3 Alternative

Under RB-3, annual VMT for automobiles and trucks within the region is forecasted to be approximately 141.6 billion miles in 2020. Annual VMT is anticipated to be approximately 237.1 million for CNG buses, 10 million for light or heavy rail, and 4.9 million for commuter rail. Given the VMT and vehicle fuel consumption on an annual basis, vehicles operating within the region are anticipated to consume approximately 154,140,321 barrels of oil, or approximately 894,014 billion BTU, per year. Oil consumption under RB-3 is anticipated to decrease by approximately 0.01 percent (12,419 barrels) when compared to the No Build Alternative. Oil consumption is anticipated to increase by 0.004 percent (5,512 barrels) when compared to the Full BRT Alternative. Therefore, a less-than-significant impact would occur.

b. RB-5 Alternative

Under RB-5, annual VMT for automobiles and trucks within the region is forecasted to be approximately 141.6 billion miles in 2020. Annual VMT is anticipated to be approximately 237.1 million miles for CNG buses, 10.0 million miles for light or heavy rail, and 4.9 million miles for commuter rail. Given the VMT and vehicle fuel consumption on an annual basis, vehicles operating within the region are anticipated to consume approximately 154,141,972 barrels of oil, or approximately 894,023 billion BTU, per year. Oil consumption under RB-5 is anticipated to decrease by approximately 0.01 percent (10,768 barrels) when compared to the No Build Alternative. Oil consumption is anticipated to increase by 0.005 percent (7,163 barrels) when compared to the Full BRT Alternative. Therefore, a less-than-significant impact would occur.

c. RB-Network Alternative

Under RB-Network, annual automobiles and trucks VMT within the region is forecasted to be approximately 141.6 billion miles in 2020. Annual VMT is anticipated to be approximately 237.3 million miles for CNG bus, 10.0 million miles for light or heavy rail, and 4.9 million miles for commuter rail. Given the annual VMT and vehicle fuel consumption rates, vehicles operating within the region are anticipated to consume approximately 154,140,791 barrels of oil, or approximately 894,017 billion BTU, per year. RB-Network consumes approximately 0.01 percent (11,949 barrels) less oil annually when compared to the No Build Alternative. When compared to the Full BRT Alternative, RB-Network consumes approximately 0.004 percent (5,982 barrels) more oil than the Full BRT Alternative. Therefore, a less-than-significant impact would occur.

8-4.8-4 Mitigation Measures

a. RB-3 Alternative

Implementation of RB-3 would reduce energy consumption within the region. This is a beneficial impact. As no significant adverse impacts would occur under RB-3, no mitigation measures are required.

b. RB-5 Alternative

Implementation of RB-5 would reduce energy consumption within the region. This is a beneficial impact. As no significant adverse impacts would occur under RB-5, no mitigation measures are required.

c. RB-Network Alternative

Implementation of RB-Network would reduce energy consumption within the region. This is a beneficial impact. As no significant adverse impacts would occur under RB-Network, no mitigation measures are required.