Chapter 20: Energy

20.1 Introduction 20-1
20.2 Affected Environment 20-2
20.2.1 Methodology 20-2
20.2.2 Existing Energy Consumption 20-2
20.3 Environmental Consequences 20-3
20.3.1 Methodology 20-3
20.3.2 No-Action Alternative 20-3
20.3.3 Salt Lake County Alternatives 20-4
20.3.4 Utah County Alternatives 20-8
20.3.5 Mitigation Measures 20-11
20.3.6 Cumulative Impacts 20-11
20.3.7 Summary of Impacts 20-12
20.4 References 20-13

20.1 Introduction

This chapter examines the existing energy usage in the energy impact analysis area as well as the energy requirements of the Mountain View Corridor (MVC) alternatives. Energy is evaluated primarily in the form of vehicle fuel consumption.

The dominant energy source for the transportation sector is petroleum, and nearly two-thirds of the petroleum consumed in the United States is used for transportation. Nationally, of the total energy used for transportation, 75% is used on highways. Of the highway energy use, 80% is used by automobiles, motorcycles, and light trucks. The remaining 20% is used by heavy trucks and buses (Davis and Hu 1991).

Fuel consumption varies with traffic characteristics. The primary traffic characteristics are traffic flow (average vehicle speed), driver behavior, the geometric configuration of the highway, the vehicle mix (cars versus trucks), and climate and weather. Traffic modeling by the Oak Ridge National Laboratory suggests that, of all the traffic-related factors, average vehicle speed accounts for most of the variability in fuel consumption and is a good predictor of fuel economy for most urban travel (Davis and Diegel 2003). Fuel efficiency under steady-flow “cruising” driving conditions peaks at 50 mph (miles per hour) to 55 mph and then declines as speeds increase. At lower speeds, fuel efficiency is reduced by engine friction, tires, use of powered accessories (such as power steering and air conditioning), and repeated braking and acceleration.

Energy Impact Analysis Area. To analyze both local and regional energy impacts, two different energy impact analysis areas were used: the MVC study area defined in Section 1.1, Study Area Description, in Chapter 1 and the region covered by the travel demand model maintained by the Wasatch Front Regional Council (WFRC) and the Mountainland Association of Governments (MAG). Each area is discussed separately in the analysis below. Energy consumption in both areas would be affected by the MVC alternatives.

20.2 Affected Environment

20.2.1 Methodology

To determine existing energy usage, the WFRC/MAG travel demand model (version 5.0) was used to determine the average daily vehicle-miles traveled (VMT) for both the MVC study area and for the region covered by the WFRC/MAG travel demand model. For existing (2001) conditions, an average vehicle fuel efficiency of 20.2 mpg (miles per gallon) was assumed; this figure includes on-the-road estimates for both cars and light trucks. The average on-the-road fuel efficiency of 20.2 mpg was divided into the average daily VMT to determine the total fuel consumption for each area.

20.2.2 Existing Energy Consumption

Table 20.2-1 shows the existing (2001) energy consumption in the MVC study area and the region covered by the WFRC/MAG travel demand model.

Table 20.2-1. Existing (2001) Average Daily Vehicle Fuel Consumption

	MVC Study Area	WFRC/MAG Regional Area
Conditions	Consumption in 2001 (gallons/day)	Consumption in 2001 (gallons/day)
Existing conditions	237,215	1,729,486

Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 20.2 mpg in 2001. Calculated using average daily VMT.

20.3 Environmental Consequences

20.3.1 Methodology

The methodology used to determine average daily VMT and energy consumption in 2030 is the same as that described in Section 20.2.1, Methodology, for the affected environment. The WFRC/MAG travel demand model was used to calculate the average daily VMT in 2030. To develop average daily VMT for the MVC study area and the WFRC/MAG regional area, each Salt Lake County alternative was modeled with the Southern Freeway Alternative from Utah County, and each Utah County alternative was modeled with the 5800 West Freeway Alternative from Salt Lake County. This procedure was used because a complete freeway must be modeled in order to generate accurate numbers.

Estimates for vehicle-miles per gallon were obtained from the U.S. Department of Energy, Energy Information Administration Annual Energy Outlook 2006 (U.S. Department of Energy 2005). For 2030, an on-the-road miles-per-gallon estimate of 22.5 mpg was used for cars and light trucks. The total fuel consumption for each of the MVC alternatives was calculated for both the MVC study area and for the region covered by the WFRC/MAG travel demand model. Each MVC alternative was then compared to the No-Action Alternative.

The complete data for average daily VMT and energy consumption in the MVC study area and the WFRC/MAG regional area are shown in Table 20.3-5, Increase in Average Daily VMT and Vehicle Fuel Consumption in the MVC Study Area in 2030, on page 20-12. For simplicity, only the data for energy consumption are shown in the tables in the following sections.

20.3.2 No-Action Alternative

Under the No-Action Alternative, the MVC project would not be constructed. Under the No-Action Alternative, average daily VMT in the MVC study area in 2030 is projected to increase by about 186% over existing 2001 conditions, and related fuel consumption is projected to increase by 157% (see Table 20.3-1 below). Average daily VMT in the region covered by the WFRC/MAG travel demand model in 2030 is projected to increase by about 88% over 2001 levels, and related fuel consumption is projected to increase by about 69%. Improved fuel efficiency of about 11% is included in the energy calculations using the on-the-road estimate discussed in Section 20.3.1, Methodology.

Under the No-Action Alternative there would be no MVC construction, so there would be no energy consumption related to construction activity.

Table 20.3-1. Average Daily Vehicle Fuel Consumption under the No-Action Alternative in 2030

	MVC Study Area		WFRC/MAG Regional Area	
Alternative	Consumption in 2030[a] (gallons/day)	Percent Increase over 2001[b]	Consumption in 2030[a] (gallons/day)	Percent Increase over 2001[b]
No-Action	609,816	157%	2,914,990	69%

[a] Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 22.5 mpg in 2030. Calculated using average daily VMT.

[b] Percent increase is compared to fuel consumption under existing conditions in 2001 (see Table 20.2-1 above, Existing (2001) Average Daily Vehicle Fuel Consumption).

20.3.3 Salt Lake County Alternatives

In Salt Lake County, two roadway alternatives and a transit alternative which would be implemented as part of the roadway alternatives are under consideration: the 5600 West Transit Alternative, the 5800 West Freeway Alternative, and the 7200 West Freeway Alternative. Under the 5600 West Transit Alternative, there is a dedicated right-of-way option and a mixed-traffic option. In addition, a tolling option was considered for each freeway alternative. Impacts under each combination of alternatives and options are discussed in the following sections.

From an efficiency perspective, the Salt Lake County alternatives would provide more-direct routes for some individual trips, which would reduce some energy use for these travelers. However, the alternatives would increase overall average daily VMT and energy consumption as a result of more trips being taken. Overall, all of the Salt Lake County alternatives would increase energy consumption compared to the No-Action Alternative.

Construction of the Salt Lake County alternatives would require energy to operate heavy vehicles and machines as well as energy to process the materials used during construction. Because the exact construction requirements are not known, total energy consumption cannot be determined. Based on the cost estimates (see Section 2.4.3, Cost), the 5600 West Transit Alternative with Dedicated Right-of-Way Transit Option would have the highest energy consumption among the transit options, and the 5800 West Freeway Alternative would have the highest energy consumption among the freeway alternatives.

20.3.3.1 5600 West Transit Alternative

As described in Chapter 2, Alternatives, two transit options are under consideration along 5600 West in Salt Lake County. One option, the Dedicated Right-of-Way Option, would incorporate a transit system running down the center of the roadway, and the other, the Mixed-Traffic Option, would

incorporate a transit system running alongside the roadway. Each option would require different amounts of energy usage in the form of fuel consumption.

5600 West Transit Alternative with Dedicated Right-of-Way Transit Option

Table 20.3-2 shows the energy consumption in the MVC study area and the region covered by the WFRC/MAG travel demand model under the 5600 West Transit Alternative with Dedicated Right-of-Way Transit Option. This energy consumption would be the same as that under the 5800 West Freeway Alternative (see Table 20.3-3 below, Average Daily Vehicle Fuel Consumption under the 5800 West and 7200 West Freeway Alternatives in 2030).

Table 20.3-2. Average Daily Vehicle Fuel Consumption under the 5600 West Transit Alternative in 2030

	MVC Study Area		WFRC/MAG Regional Area	
Alternative	Consumption in 2030[a] (gallons/day)	Percent Increase over No-Action[b]	Consumption in 2030[a] (gallons/day)	Percent Increase over No-Action[b]
5600 West Transit	731,800	20%	2,987,061	2%

[a] Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 22.5 mpg in 2030. Calculated using average daily VMT.

[b] Percent increase is compared to fuel consumption under the No-Action Alternative in 2030 (see Table 20.3-1 above, Average Daily Vehicle Fuel Consumption under the No-Action Alternative in 2030).

The 5600 West Transit Alternative (as either the Dedicated Right-of-Way Transit Option or the Mixed-Use Transit Option) would be built as part of the Salt Lake County freeway alternatives; therefore, the travel demand modeling used to determine average daily VMT under the transit alternative included the MVC freeway alternatives for Salt Lake County. Once built, the 5600 West Transit Alternative would likely reduce average daily VMT because some travelers would use public transit instead of a private vehicle.

5600 West Transit Alternative with Mixed-Traffic Transit Option

Energy consumption under the Mixed-Traffic Transit Option would be the same as that under as the Dedicated Right-of-Way Transit Option, except that there would likely be less energy consumption during construction based on the lower construction cost (see Chapter 2, Alternatives).

20.3.3.2 5800 West Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from Interstate 80 (I-80) to the Utah County line.

Compared to the No-Action Alternative, the 5800 West Freeway Alternative would result in increased energy consumption both in the MVC study area and in the region covered by the WFRC/MAG travel demand model. Under the 5800 West Freeway Alternative, average daily VMT and energy consumption in the MVC study area in 2030 would be about 20% higher than under the No-Action Alternative (see Table 20.3-3). In the WFRC/MAG regional area in 2030, average daily VMT and energy consumption would be about 2% higher than under the No-Action Alternative.

Table 20.3-3. Average Daily Vehicle Fuel Consumption under the 5800 West and 7200 West Freeway Alternatives in 2030

	MVC Study Area		WFRC/MAG Regional Area	
Alternative/Option	Consumption in 2030[a] (gallons/day)	Percent Increase over No-Action[b]	Consumption in 2030[a] (gallons/day)	Percent Increase over No-Action[b]
5800 West Freeway	731,800	20%	2,987,061	2%
5800 West Freeway with Tolling Option	665,964	9%	2,941,901	1%
7200 West Freeway	725,064	19%	2,974,727	2%
7200 West Freeway with Tolling Option	659,943	8%	2,933,279	1%

[a] Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 22.5 mpg in 2030. Calculated using average daily VMT.

[b] Percent increase is compared to fuel consumption under the No-Action Alternative in 2030 (see Table 20.3-1 above, Average Daily Vehicle Fuel Consumption under the No-Action Alternative in 2030).

Combined Impacts of 5800 West Freeway and 5600 West Transit Alternatives

The 5800 West Freeway Alternative would be implemented with one of the two 5600 West Transit Alternative options.

5800 West Freeway Alternative with Dedicated Right-of-Way Transit Option

Regionally and within the MVC study area, the average daily VMT and energy consumption for this combination are projected to increase by the same amount as for the 5800 West Freeway Alternative.

5800 West Freeway Alternative with Mixed-Traffic Transit Option

Regionally and within the MVC study area, the average daily VMT and energy consumption for this combination are projected to increase by the same amount as for the 5800 West Freeway Alternative. Construction energy costs would be lower than those for the Dedicated Right-of-Way Transit Option based on the total cost of this option.

5800 West Freeway Alternative with Tolling Option

The Tolling Option would reduce energy consumption compared to the non-tolled option because the toll cost would discourage some travelers from using the MVC, which would result in a lower average daily VMT. Under the Tolling Option, energy consumption in the MVC study area in 2030 would be about 9% higher than under the No-Action Alternative (see Table 20.3-3 above, Average Daily Vehicle Fuel Consumption under the 5800 West and 7200 West Freeway Alternatives in 2030). In the WFRC/MAG regional area in 2030, energy consumption would be about 1% higher than under the No-Action Alternative.

20.3.3.3 7200 West Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from I-80 to the Utah County line.

Compared to the No-Action Alternative, the 7200 West Freeway Alternative would result in increased energy consumption both in the MVC study area and in the region covered by the WFRC/MAG travel demand model. Under the 7200 West Freeway Alternative, average daily VMT and energy consumption in the MVC study area in 2030 would be about 19% higher than under the No-Action Alternative (see Table 20.3-3 above, Average Daily Vehicle Fuel Consumption under the 5800 West and 7200 West Freeway Alternatives in 2030). In the WFRC/MAG regional area in 2030, average daily VMT and energy consumption would be about 2% higher than under the No-Action Alternative.

Combined Impacts of 7200 West Freeway and 5600 West Transit Alternatives

As with the 5800 West Freeway Alternative, the 7200 West Freeway Alternative would be implemented with one of the two 5600 West Transit Alternative options.

7200 West Freeway Alternative with Dedicated Right-of-Way Transit Option

Regionally and within the MVC study area, the average daily VMT and energy consumption for this combination are projected to increase by the same amount as for the 7200 West Freeway Alternative.

7200 West Freeway Alternative with Mixed-Traffic Transit Option

Regionally and within the MVC study area, the average daily VMT and energy consumption for this combination are projected to increase by the same amount as for the 7200 West Freeway Alternative. Construction energy costs would be lower than those for the Dedicated Right-of-Way Transit Option based on the total cost of this option.

7200 West Freeway Alternative with Tolling Option

The Tolling Option would reduce energy consumption compared to the non-tolled option because the toll cost would discourage some travelers from using the MVC, which would result in a lower average daily VMT. Under the Tolling Option, energy consumption in the MVC study area in 2030 would be about 8% higher than under the No-Action Alternative (see Table 20.3-3 above, Average Daily Vehicle Fuel Consumption under the 5800 West and 7200 West Freeway Alternatives in 2030). In the WFRC/MAG regional area in 2030, energy consumption would be about 1% higher than under the No-Action Alternative.

20.3.4 Utah County Alternatives

In Utah County, three alternatives are under consideration: the Southern Freeway Alternative, the 2100 North Freeway Alternative, and the Arterials Alternative. In addition, a tolling option was evaluated for each Utah County alternative. Impacts under each combination of alternatives and options are discussed in the following sections.

From an efficiency perspective, the Utah County alternatives would reduce energy consumption by providing more-direct routes for some individual trips, which would reduce some energy use for these travelers. However, the alternatives would increase overall average daily VMT and energy consumption

as a result of more trips being taken. Overall, all of the Utah County alternatives would increase energy consumption compared to the No-Action Alternative.

Construction of the Utah County alternatives would require energy to operate heavy vehicles and machines as well as energy to process the materials used during construction. Because the exact construction requirements are not known, total energy consumption cannot be determined. Based on the cost estimates (see Section 2.4.3, Cost), the Southern Freeway Alternative would have the highest energy consumption and the 2100 North Freeway Alternative would have the lowest.

20.3.4.1 Southern Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from the Utah County line to Interstate 15 (I-15) at Lindon.

Compared to the No-Action Alternative, the Southern Freeway Alternative would result in increased energy consumption both in the MVC study area and in the region covered by the WFRC/MAG travel demand model. Under the Southern Freeway Alternative, average daily VMT and energy consumption in the MVC study area in 2030 would be about 21% higher than under the No-Action Alternative (see Table 20.3-4). In the WFRC/MAG regional area in 2030, average daily VMT and energy consumption would be about 3% higher than under the No-Action Alternative.

Table 20.3-4. Average Daily Vehicle Fuel Consumption under the Utah County Alternatives in 2030

	MVC Study Area		WFRC/MAG Regional Area	
Alternative/Option	Consumption in 2030[a] (gallons/day)	Percent Increase over No-Action[b]	Consumption in 2030[a] (gallons/day)	Percent Increase over No-Action[b]
Southern Freeway	736,087	21%	3,014,118	3%
Southern Freeway with Tolling Option	668176	10%	2,954,978	1%
2100 North Freeway	736,734	21%	2,999,623	3%
2100 North Freeway with Tolling Option	672,852	10%	2,959,914	2%
Arterials	719,257	18%	2,997,877	3%
Arterials with Tolling Option	667,764	10%	2,952,746	1%

[a] Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 22.5 mpg in 2030. Calculated using average daily VMT.

[b] Percent increase is compared to fuel consumption under the No-Action Alternative in 2030 (see Table 20.3-1 above, Average Daily Vehicle Fuel Consumption under the No-Action Alternative in 2030).

Southern Freeway Alternative with Tolling Option

The Tolling Option would reduce energy consumption compared to the non-tolled option because the toll cost would discourage some travelers from using the MVC, which would result in a lower average daily VMT. Under the Tolling Option, energy consumption in the MVC study area in 2030 would be about 10% higher than under the No-Action Alternative (see Table 20.3-4 above, Average Daily Vehicle Fuel Consumption under the Utah County Alternatives in 2030). In the region in 2030, energy consumption would be about 1% higher than under the No-Action Alternative.

20.3.4.2 2100 North Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from the Utah County line to State Route (SR) 73 in Saratoga Springs and a lateral freeway extending east along 2100 North to I-15 in Lehi.

Compared to the No-Action Alternative, the 2100 North Freeway Alternative would result in increased energy consumption both in the MVC study area and in the region covered by the WFRC/MAG travel demand model. Under the 2100 North Freeway Alternative, average daily VMT and energy consumption in the MVC study area in 2030 would be about 21% higher than under the No-Action Alternative (see Table 20.3-4 above, Average Daily Vehicle Fuel Consumption under the Utah County Alternatives in 2030). In the WFRC/MAG regional area in 2030, average daily VMT and energy consumption would be about 3% higher than under the No-Action Alternative.

2100 North Freeway Alternative with Tolling Option

The Tolling Option would reduce energy consumption compared to the non-tolled option because the toll cost would discourage some travelers from using the MVC, which would result in a lower average daily VMT. Under the Tolling Option, energy consumption in the MVC study area in 2030 would be about 10% higher than under the No-Action Alternative (see Table 20.3-4 above, Average Daily Vehicle Fuel Consumption under the Utah County Alternatives in 2030). In the WFRC/MAG regional area in 2030, energy consumption would be about 2% higher than under the No-Action Alternative.

20.3.4.3 Arterials Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a series of arterial roadways throughout northern Utah County. The combination of arterials includes a freeway segment from the Utah County line to SR 73 and arterial roadways at Porter Rockwell Boulevard, 2100 North, and 1900 South.

Compared to the No-Action Alternative, the Arterials Alternative would result in increased energy consumption both in the MVC study area and in the region covered by the WFRC/MAG travel demand model. Under the Arterials Alternative, average daily VMT and energy consumption in the MVC study area in 2030 would be about 18% higher than under the No-Action Alternative (see Table 20.3-4 above, Average Daily Vehicle Fuel Consumption under the Utah County Alternatives in 2030). In the WFRC/MAG regional area in 2030, average daily VMT and energy consumption would be about 3% higher than under the No-Action Alternative.

Arterials Alternative with Tolling Option

The Tolling Option would reduce energy consumption compared to the non-tolled option because the toll cost would discourage some travelers from using the MVC, which would result in a lower average daily VMT. Under the Tolling Option, energy consumption in the MVC study area in 2030 would be about 10% higher than under the No-Action Alternative (see Table 20.3-4 above, Average Daily Vehicle Fuel Consumption under the Utah County Alternatives in 2030). In the WFRC/MAG regional area in 2030, energy consumption would be about 1% higher than under the No-Action Alternative.

20.3.5 Mitigation Measures

No mitigation measures would be required for energy use. However, several of the mitigation measures listed in Chapter 12, Air Quality (such as turning off construction equipment when not in use), would reduce construction-related energy consumption.

20.3.6 Cumulative Impacts

Cumulative impacts were analyzed for local and regionally important issues (farmlands, air quality, water quality, and ecosystems) as developed with resource agencies and the public during scoping. See Chapter 25, Cumulative Impacts, for a more detailed discussion of cumulative impacts.

20.3.7 Summary of Impacts

Table 20.3-5 summarizes the direct impacts to energy in the MVC study area from the Salt Lake County and Utah County alternatives. From an efficiency perspective, all of the action alternatives would provide more-direct routes for some travelers and reduce some congestion. However, the alternatives would increase average daily VMT and energy consumption. Overall, all of the action alternatives would increase energy consumption compared to the No-Action Alternative.

On average, the non-tolled alternatives in both counties would increase energy consumption by about 20% compared to the No-Action Alternative. On average, the tolling options in both counties would reduce energy consumption by about 9% to 10% compared to the non-tolled options because the toll cost would discourage some travelers from using the MVC, which would result in a lower average daily VMT.

Table 20.3-5. Increase in Average Daily VMT and Vehicle Fuel Consumption in the MVC Study Area in 2030

	Percent Increase over No-Action	
Alternative/Option	**Average Daily VMT**	**Fuel Consumption**
Salt Lake County Alternatives		
5600 West Transit [a]	20%	20%
5800 West Freeway	20%	20%
5800 West Freeway with Tolling Option	9%	9%
7200 West Freeway	19%	19%
7200 West Freeway with Tolling Option	8%	8%
Utah County Alternatives		
Southern Freeway	21%	21%
Southern Freeway with Tolling Option	10%	10%
2100 North Freeway	21%	21%
2100 North Freeway with Tolling Option	10%	10%
Arterials	18%	18%
Arterials with Tolling Option	10%	10%

[a] Modeled as part of the 5800 West Freeway Alternative.

20.4 References

Davis, S.C., and S.W. Diegel

2003 *Transportation Energy Data Book*, 23rd Edition. Center for Transportation Analysis Engineering Science, and Technology Division, Oak Ridge National Laboratory. October.

Davis, S.C., and P.S. Hu

1991 *Transportation Energy Data Book*, 11th Edition. Center for Transportation Analysis, Energy, Science and Technology Division, Oak Ridge National Laboratory. January.

U.S. Department of Energy

2005 Energy Information Administration, Annual Energy Outlook, Table A7, December 12. www.eia.doe.gov/oiaf/aeo/aeoref_tab.html.

This page is intentionally blank.