WEST DAVIS CORRIDOR

Chapter 19: Energy Impacts

19.1 Introduction

This chapter examines the existing energy use in the energy impact analysis area as well as the energy requirements of the West Davis Corridor (WDC) alternatives. Energy is evaluated primarily in the form of vehicle fuel consumption.

What is the energy impact analysis area?

The energy impact analysis area is the same as the WDC study area described in Section 1.2, Description of the Needs Assessment Study Area.

The dominant energy source for the transportation sector is petroleum, and about 70% of the petroleum consumed in the United States is used for transportation. Nationally, of the total energy used for transportation, 86% is used on highways. Of the highway energy use, 74% is used by automobiles, motorcycles, and light trucks. The remaining 26% is used by heavy trucks and buses (Oak Ridge National Laboratory 2011).

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. The energy impact analysis area is the same as the WDC study area defined in Section 1.2, Description of the Needs Assessment Study Area.

19.2 Affected Environment

19.2.1 Methodology

To determine existing energy use, the WDC team used the travel demand model (version 8.1) maintained by the Wasatch Front Regional Council (WFRC) to determine the average daily vehicle-miles traveled (VMT) in the WDC study area.

For existing (2015) conditions, an average vehicle fuel efficiency of 25 miles per gallon (mpg) was used based on information from the U.S. Department of Energy (2016, Table A7); this number includes on-the-road estimates for both cars and light trucks. The average on-the-road fuel efficiency of 25 mpg was divided into the average daily VMT to determine the total fuel consumption for each area.

What is a travel demand model?

A travel demand model is a software tool for predicting future travel demand, which is the expected number of transportation trips in an area. The travel demand model used for the WDC Project is maintained by WFRC, which is the metropolitan planning organization for the WDC study area.

19.2.2 Existing Energy Consumption

Table 19-1 shows the existing (2015) average daily vehicle fuel consumption in the WDC study area.

Table 19-1. Existing (2015) Average Daily Vehicle Fuel Consumption

	WDC Study Area
Conditions	**Consumption in 2015 (gallons/day)**
Existing conditions	166,836

Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 25 mpg in 2015. Calculated using average daily VMT.

19.3 Environmental Consequences

19.3.1 Methodology

The methodology used to determine average daily VMT and energy consumption in 2040 is the same as that described in Section 19.2.1, Methodology, for the affected environment. The WDC team used the WFRC travel demand model (version 8.1) to calculate the average daily VMT in 2040 in the WDC study area and for each WDC alternative.

Estimates for vehicle-miles per gallon were obtained from the U.S. Department of Energy's *Annual Energy Outlook 2016* (U.S. Department of Energy 2016, Table A7). The WDC team used the on-the-road miles-per-gallon estimate of 38.6 mpg for 2040 for cars and light trucks. The total fuel consumption for each of the WDC action alternatives was calculated for the WDC study area using the WFRC travel demand model. Each WDC alternative was then compared to the No-Action Alternative.

The complete data for average daily VMT and energy consumption in the WDC study area are shown in Table 19-8, Increase in Average Daily VMT and Vehicle Fuel Consumption in the WDC Study Area in 2040, on page 19-7. For simplicity, only the data for fuel consumption are shown in the tables in the following sections.

19.3.2 No-Action Alternative

With the No-Action Alternative, the WDC would not be constructed. With the No-Action Alternative, average daily VMT in the WDC study area in 2040 is projected to increase by about 46% over existing (2015) conditions, and related fuel consumption is projected to decrease by 5.4% (see Table 19-2). Improved fuel efficiency of about 54% is included in the energy calculations using the on-the-road estimate discussed in Section 19.3.1, Methodology. The substantially higher fuel efficiency in 2040 compared to 2015 (38.6 mpg versus 25 mpg) resulted in a decrease in fuel consumption, even though VMT increased by 46%.

With the No-Action Alternative, there would be no WDC construction, so there would be no energy consumption related to project construction activity.

Table 19-2. Average Daily Vehicle Fuel Consumption with the No-Action Alternative in 2040

	WDC Study Area	
Alternative	Consumption in 2040[a] (gallons/day)	Percent Decrease over 2015[b]
No-Action	157,782	5.4%

[a] Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 38.6 mpg in 2040. Calculated using average daily VMT.

[b] Percent decrease is compared to fuel consumption under existing conditions in 2015 [see Table 19-1 above, Existing (2015) Average Daily Vehicle Fuel Consumption].

19.3.3 Alternatives A1–A2

As described in Chapter 2, Alternatives, Alternative A is the more westerly alternative and consists of two separate alternatives: Alternatives A1 and A2. These alternatives are defined in Table 19-3.

Table 19-3. Components of Alternatives A1–A2

Alternative	I-15 Connection	Four-Lane Highway	Two-Lane Highway	West Point/ Hooper Cities Segment	North Terminus
A1	Glovers Lane	I-15 to 2000 West	2000 West to 1800 North	4100 West	1800 West (West Point)
A2	Glovers Lane	I-15 to 2000 West	2000 West to 5500 South	5400 West	5500 South (Hooper)

From an efficiency perspective, Alternatives A1 and A2 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, Alternatives A1 and A2 would increase energy consumption by 2.7% compared to the No-Action Alternative (see Table 19-4). Of the A Alternatives, Alternative A1 would result in the greatest energy consumption.

Construction of the 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 project length, the A Alternatives would have higher construction-related energy consumption than the B Alternatives, with Alternative A2 likely having the greatest overall construction energy requirements.

Table 19-4. Average Daily Vehicle Fuel Consumption with Alternatives A1–A2 in 2040

	Travel on Each WDC Alternative		Travel in the WDC Study Area	
Alternative	Consumption in 2040[a] (gallons/day)	Percent Increase over No-Action[b]	Consumption in 2040[a] (gallons/day)	Percent Increase over No-Action[c]
A1	12,005	—	162,062	2.7%
A2	11,539	—	162,036	2.7%

[a] Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 38.6 mpg in 2040. Calculated using average daily VMT in 2040.

[b] Because there would be no WDC with the No-Action Alternative, no comparison can be made to the WDC action alternatives.

[c] Percent increase is compared to fuel consumption with the No-Action Alternative in 2040 (see Table 19-2 above, Average Daily Vehicle Fuel Consumption with the No-Action Alternative in 2040).

WEST DAVIS CORRIDOR

19.3.4 Alternatives B1–B2

As described in Chapter 2, Alternatives, Alternative B is the more easterly alternative and consists of two separate alternatives: Alternatives B1 and B2. These alternatives are defined in Table 19-5.

Table 19-5. Components of Alternatives B1–B2

Alternative	I-15 Connection	Four-Lane Highway	Two-Lane Highway	West Point City Segment	North Terminus
B1	Glovers Lane	I-15 to Antelope Drive[a]	Antelope Drive to 1800 North	4100 West	1800 North (West Point)
B2	Glovers Lane	I-15 to Antelope Drive[a]	Antelope Drive to 1800 North	4800 West	1800 North (West Point)

[a] The transition from a four-lane highway to a two-lane highway would occur between Antelope Drive and 700 South.

From an efficiency perspective, Alternatives B1 and B2 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, Alternatives B1 and B2 would increase energy consumption by between 3.2% and 3.3% compared to the No-Action Alternative (see Table 19-6 below). Of the B Alternatives, Alternative B1 would result in the greatest energy consumption. Because the B Alternatives are farther east and closer to developed areas, the alternatives result in slightly more use by the traveling public and thus slightly higher fuel consumption than the A Alternatives.

Construction of the 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 project length, the B Alternatives would have slightly less construction-related energy consumption than the A Alternatives, with Alternative B1 likely having the least overall construction energy requirements.

Table 19-6. Average Daily Vehicle Fuel Consumption with Alternatives B1–B2 in 2040

	Travel on Each WDC Alternative		Travel in the WDC Study Area	
Alternative	Consumption in 2040[a] (gallons/day)	Percent Increase over No-Action[b]	Consumption in 2040[a] (gallons/day)	Percent Increase over No-Action[c]
B1	14,539	—	163,507	3.3%
B2	13,990	—	162,902	3.2%

[a] Fuel consumption (in gallons) is based on an average on-the-road fuel efficiency of 38.6 mpg. Calculated using average daily VMT in 2040.

[b] Because there would be no WDC with the No-Action Alternative, no comparison can be made to the WDC action alternatives.

[c] Percent increase is compared to fuel consumption with the No-Action Alternative in 2040 (see Table 19-2 above, Average Daily Vehicle Fuel Consumption with the No-Action Alternative in 2040).

19.3.5 Wetland Avoidance Options

Two wetland avoidance options are being evaluated in this Final EIS, as shown in Table 19-7. The purpose of these options is to avoid wetland impacts per guidance from the U.S. Army Corps of Engineers on wetland avoidance. Either wetland avoidance option could be implemented with any of the A or B Alternatives.

In this section, the impact information for the wetland avoidance options provides only the differences in impacts for the A and B Alternatives as a result of using the wetland avoidance options. The differences in impacts would apply to any of the A and B Alternatives if they were to use the wetland avoidance options.

Table 19-7. Components of the Wetland Avoidance Options

Option	Location	City	Description
Farmington	Prairie View Drive and West Ranches Road	Farmington	Shift the A and B Alternatives in Farmington about 150 feet east to the southwest side of the intersection of Prairie View Drive and West Ranches Road.
Layton	2200 West and 1000 South	Layton	Shift the A and B Alternatives in Layton about 500 feet east to the northeast side of the intersection of 2200 West and 1000 South.

The wetland avoidance options would not change the overall VMT for Alternatives A1, A2, B1, and B2 because the options would not substantially change the distance driven. Therefore, energy consumption for the wetland avoidance options would be the same as for Alternatives A1, A2, B1, and B2.

19.3.6 Mitigation Measures

No mitigation is proposed.

19.3.7 Cumulative Impacts

There are no anticipated cumulative impacts to energy use. Cumulative impacts were analyzed for local and regionally important issues (ecosystem resources, air quality, water quality, floodplains, farmland, economics, and community impacts). The list of resources analyzed for cumulative impacts was developed with input from resource agencies and the public during scoping. For a more detailed discussion of cumulative impacts, see Chapter 24, Cumulative Impacts.

What are cumulative impacts?

Cumulative impacts are the resulting impacts from the proposed action combined with impacts from other past, present, and reasonably foreseeable future actions.

19.3.8 Summary of Impacts

Table 19-8 summarizes the direct impacts to energy in the WDC study area. From an efficiency perspective, all of the action alternatives would provide more-direct routes for some travelers and would reduce some congestion.

Overall, all of the action alternatives would increase energy consumption compared to the No-Action Alternative. On average, the alternatives would increase energy consumption by about 2.7% to 3.3% compared to the No-Action Alternative.

Table 19-8. Increase in Average Daily VMT and Vehicle Fuel Consumption in the WDC Study Area in 2040

	Percent Increase over No-Action	
Alternative	Average Daily VMT	Fuel Consumption
A1	2.7%	2.7%
A2	2.7%	2.7%
B1	3.3%	3.3%
B2	3.2%	3.2%

19.4 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.

Oak Ridge National Laboratory

2011 Transportation Energy Data Book, 30th Edition. Center for Transportation Analysis, Energy and Transportation Science. June.

U.S. Department of Energy, Energy Information Administration

2016 Annual Energy Outlook 2016 with Projections to 2040. August.