3.17 ENERGY

Energy is consumed during operation of transportation facilities, and during the construction of transportation projects. Most of this operational energy consumption is in the form of gasoline burned by vehicles, with a negligible amount of energy for traffic signals, roadway lighting, and maintenance. Fuel consumption depends on many variables including vehicle miles traveled (VMT), speed, and travel conditions (such as vehicle type, roadway geometry, and pavement type). Of these variables, studies have shown that speed accounts for most of the variation in fuel consumption (Davis and Diegel, 2007). During construction, energy is used to manufacture and transport materials and to operate construction machinery (see section 3.18 – Construction Impacts and Mitigation for discussion on energy used during construction).

Common units of energy measurement are joules and British Thermal Units (BTUs). Because these are relatively small units, energy is often reported in giga joules (billion joules) and million BTUs (MBTUs). One giga joule is the equivalent of 0.95 MBTUs. One gallon of gasoline contains approximately 0.13 MBTUs. As a point of reference, the caloric intake for an adult person, assuming 2,000 calories per day, is approximately 3 giga joules per year (2,000 calories = 0.008 giga joules).

3.17.1 Methodology

The analysis of operational energy within the project study area is based on the traffic analyses prepared for this project. Net changes in overall energy consumption caused by operation of the Midvalley Highway alternatives were assessed by using peak hour VMT and the calculated speed values.

Operational energy consumption is calculated by using average network speed to arrive at a fuel consumption rate (Davis and Diegel, 2007) and multiplying that rate by the VMT. For each point in time, the network is defined as all the roadways within the project study area at that time (i.e. existing, No Build and 2030). The average network speed is provided by the traffic model. The fuel consumption rate is the inverse of fuel economy (i.e. 20 miles per gallon = 0.05 gallons per mile). The data used in this analysis is based on 1997 light duty vehicles (Davis and Diegel, 2003: Table 4-24).

Daily VMT multiplied by the fuel consumption rate produces a value in gallons of fuel consumed per day. That value is then converted into giga joules and MBTUs to create the data presented in this section. These values are only approximate for each Midvalley Highway alternative, and do not include the minimal energy used for facility maintenance and signal operation. However, this method provides a good basis for comparing the alternatives.

3.17.2 Affected Environment

In 2005, petroleum use in the state of Utah accounted for approximately 38 percent of statewide energy consumption (USDOE, 2005). Approximately 44 percent of petroleum use is for motor vehicle fuel. In 2005, approximately 484 million gallons of fuel were consumed by motor vehicles in the state of Utah. Total statewide annual energy consumption was 757 trillion BTUs in 2005 (USDOE, 2005).

Exhibit 3.17-1 illustrates gasoline consumption in Utah between 1995 and 2005. It shows a trend of increasing consumption.

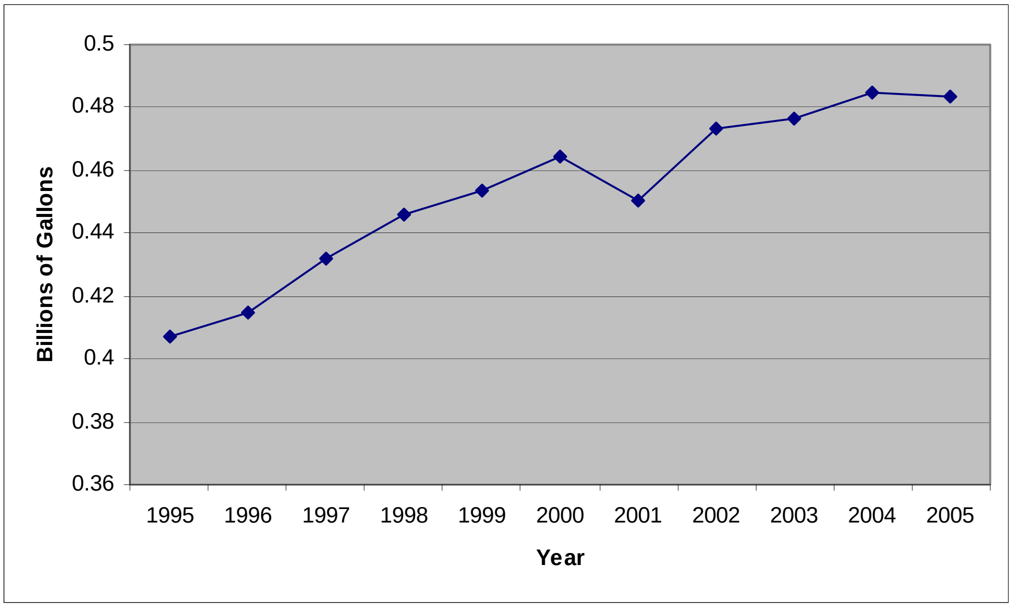

EXHIBIT 3.17-1, STATE OF UTAH FUEL CONSUMPTION 1995-2005

Existing operational energy consumption in the project study area is analyzed by the method described above, with existing VMT (existing year) and average network speed. Given an average speed of 37.3 mile per hour (mph), existing gasoline consumption in the project study area is about 23,000 gallons, equivalent to about 3,000 MBTU or 31,000 giga joules per day.

3.17.3 Environmental Consequences

The Midvalley Highway project would create the greatest energy demands in the long-term operational energy consumption related to vehicles. The environmental consequence of operational energy consumption is considered in this section.

Fuel Consumption

Traffic is predicted to increase in the project study area by the year 2030, independent of the Midvalley Highway project. The estimated 2030 energy consumption, resulting from daily vehicle operations in the project study area, is shown in Table 3.17-1. Consumption is calculated by using average network speed to calculate a fuel consumption rate and multiplying that rate by VMT.

TABLE 3.17-1, ENERGY CONSUMPTION FOR EACH ALTERNATIVE IN 2030

Alternative	Daily VMT	Average Network Speed (mph)	Fuel Consumption Rate	Daily Energy Consumption		
				Gallons	Giga Joules	MBTUs
No Build	1,703,000	26.3	0.0325	55,348	7,555	7,195
Midvalley Highway East (both options)	1,948,000	42.6	0.0319	62,141	8,482	8,078
Midvalley Highway West (both options)	1,978,000	43.1	0.0319	63,098	8,613	8,203

Note: The differences in VMT and the resulting fuel consumption are negligible between the options for the Midvalley Highway alternatives.

Under the No Build Alternative, 2030 VMT daily will increase to 1.7 million. Given an average speed of 26.3 mph, approximately 55,350 gallons of fuel would be consumed per day; this is the equivalent of about 7,200 MBTUs or 7,500 giga joules.

Under the Midvalley Highway alternatives, 2030 VMT would increase to over 1.9 million. Average speed would also increase, to about 43 mph. This would result in about 62,000 gallons for the Midvalley Highway East Alternative and about 63,000 gallons of fuel consumed for the Midvalley Highway West Alternative. The energetic equivalents of these values are in Table 3.17-1.

Differences in energy consumption between the Midvalley Highway East Alternative and the Midvalley Highway West Alternative are negligible, within 1.5 % of each other. Energy consumption under either alternative would be approximately 12-14% higher than the No Build Alternative.

3.17.3.1 Indirect Impacts

The Midvalley Highway alternatives would have no indirect impacts on energy.

3.17.4 Mitigation

The anticipated energy consumption during the operation of the Midvalley Highway is similar for each alternative. No mitigation is proposed.

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