

ENERGY

This section discusses the energy that would be used within the region for the No-Action and action alternatives. Primary energy use would be fossil fuel consumption by vehicles traveling within and around the Study Area. Other energy use would be associated with construction, maintenance, and development activities. Fuel would be consumed during the planned construction of new arterial streets and freeways identified in the RTP and regional transportation programs. Also, fuel would be consumed during construction of commercial developments, industrial buildings, and residences throughout the Study Area and surrounding region. Operational energy use was calculated using VMT and vehicle hours traveled projections from the MAG travel demand model, vehicle mix percentages from the Maricopa County vehicle registration records, and fuel economy data from the U.S. Department of Energy’s Energy Information Administration.

AFFECTED ENVIRONMENT

The average fuel economy of the nation’s vehicles, measured in miles per gallon (mpg), has been consistently improving over the past 40 years, and this trend is expected to continue during the next 20 years. Barring

a technological breakthrough in the engines providing power to the vehicles of 2035, a substantial change in fuel economy is unlikely and, therefore, not assumed in the analysis. Even with such a breakthrough, penetration of a new technology across the country’s total vehicle fleet can take decades. The average fuel economy of a passenger car operated in the United States in 1987 was 18 mpg and, 20 years later in 2007, it was 22.5 mpg (Energy Information Administration 2009). Automobiles are most efficient when operating at steady speeds between 35 mph and 45 mph with no stops (Oak Ridge National Laboratory 2002; USDOT 1983). Fuel consumption increases by approximately 30 percent when speeds drop from 30 mph to 20 mph, and a drop from 30 mph to 10 mph results in a 100 percent increase in fuel use. Similarly, fuel consumption increases by approximately 17 percent as speeds increase from 55 mph to 70 mph.

Total fuel consumption in the United States has also consistently risen from year to year. From 1987 to 2007, motor vehicle fuel consumption increased from 125 to 176 billion gallons per year in the United States, and the state of Arizona consumed 3.8 billion gallons per year, or 2 percent of the 2007 total (USDOT Bureau of Transportation Statistics 2009). Increased congestion on freeways and arterial streets has become a major contributor to the increase in fuel consumption. The 2007 *Annual Urban Mobility Report* (Texas Transportation Institute 2007) reported that vehicles in the Phoenix urban area consumed approximately 59 million gallons of fuel in 2007 because of congestion.

ENVIRONMENTAL CONSEQUENCES

Impact Overview, All Alternatives

Construction activities for any of the action alternatives would have comparable fuel commitments. While the No-Action Alternative would not need fuel for construction, other road projects and improvements would need to be developed in the Study Area to accommodate the region’s growth. Construction energy use is not addressed in further detail because the total fuel needed for construction of the action alternatives is assumed to be essentially the same as the total fuel needed for construction of other road projects under the No-Action Alternative.

Operational energy use was calculated by dividing the yearly VMT projections for each of the action alternatives and for the No-Action Alternative by the fuel economy of the different classes of vehicles. The analysis included light-duty cars, light-duty trucks, and heavy-duty trucks and buses, which have average fuel economies of 22.5 mpg, 18 mpg, and 5.9 mpg, respectively. Fuel economies were adjusted for each alternative based on the projected average speed (mph), and were calculated by dividing the VMT by the vehicle hours traveled.

Table 4-52 shows that among the action alternatives, operational energy use is essentially the same and that all action alternatives are projected to result in less fuel consumption than the No-Action Alternative. Implementing the W59, W71, or W101 Alternative with the E1 Alternative would reduce fuel consumption regionwide by approximately 40 million gallons per year when compared with the No-Action Alternative. Although the No-Action Alternative shows the smallest VMT of all the alternatives, substantially more fuel use is projected because of the higher vehicle hours traveled. Lower speeds and, therefore, lower fuel economy are associated with the No-Action Alternative.

If the No-Action Alternative were to become the Selected Alternative, energy use due to project construction would not occur; operational energy use, however, would be higher because of higher levels of traffic congestion.

MITIGATION

No mitigation is proposed for energy use associated with the proposed action.

CONCLUSIONS

The No-Action Alternative would involve the most energy consumption of all of the alternatives. In 2035, it would consume approximately 40 million gallons of fuel per year more than any of the action alternatives. The annual fuel consumption savings associated with any of the action alternatives would represent substantial economic savings over the design life of the freeway, regardless of fluctuations in fuel prices.

Table 4-52 Annual Regional Energy Consumption, 2035

	No-Action Alternative	Action Alternative			
		W59/E1	W71/E1	W101/E1	
Vehicle Miles Traveled per Year^a (millions)	57,390	57,844	57,824	57,841	
Operational Energy Use ^b (millions of gallons per year)	Passenger cars ^c	1,961	1,942	1,942	1,941
	Light-duty trucks ^c	621	615	615	615
	Heavy-duty trucks ^c	1,641	1,625	1,625	1,625
	Total	4,223	4,182	4,182	4,181

Note: Operational energy use for action alternatives was calculated by combining action alternatives from the Western and Eastern Sections.

^a Vehicle miles traveled per year (VMT/yr) were calculated from daily VMT estimates provided by the Maricopa Association of Governments in its travel demand model (2010b). Daily estimates were converted to annual estimates by assuming 6 days per week (the equivalent of 1 day of traffic for Saturday and Sunday combined) and 52 weeks per year.

^b Gallons/year data were determined by dividing the VMT for each category by an assumed base fuel economy factor for each class, adjusted by miles per gallon according to speed (VMT/vehicle hours traveled). Base factors were obtained from the Monthly Energy Review (Energy Information Administration 2009).

^c Vehicle mix data were derived from Maricopa County vehicle registrations as projected by the Maricopa Association of Governments through 2035. Gasoline and diesel vehicles for all classes were combined. Buses were added to the heavy-duty trucks category. Motorcycles and alternative fuel and electric vehicles were assumed to have an insignificant contribution.