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3.28 ENERGY IMPACTS

This section compares energy use by automobile and trucks within the 12-County Study Area for No-Build condition and 10 Mid-States Corridor alternative/facility type combinations. The traffic assignments supporting the calculations in **Table 3.28-1** and **Table 3.28-2** include the Local Improvements for each alternative.

3.28.1 Introduction

Automobile and trucks are popular modes for transporting people and goods. According to US Department of Energy, approximately 28% of total energy consumption in 2019 in the United States was for transporting people and goods (Source: www.eia.gov). This energy impact comparison analyzes direct energy consumption for vehicle travel within the 12-County Study Area.

3.28.2 Methodology

Travel characteristics for horizon year 2045 No-Build scenario and 10 route/facility type combinations were analyzed using the Travel Demand Model (TDM) developed for this study. TDM outputs include daily automobile and truck volumes, daily Vehicle Miles Traveled (VMT), Vehicle Hours of Travel (VHT), and travel speeds for each link in the highway network. The study team used TREDIS software tool for evaluating economic, social, and environmental impacts and benefit-cost analysis for each alternative compared with the No-Build scenario. TREDIS is INDOT’s standard analysis tool for comparing the benefits and costs for transportation projects. TREDIS assumes automobiles use gasoline and multi-unit trucks (heavy duty) use diesel fuel.

Vehicle Type	Fuel Type	Gallons Per Mile
Auto	Gasoline	0.045
Multi-Unit Truck	Diesel	0.1521

Table 3.28-1: TREDIS Fuel Consumption Rates

Fuel Type	Btu Per Gallon
Gasoline (10% ethanol by volume)	120,286
Diesel	137,381

Table 3.28-2: Motor Fuel to Btu Conversion Factors

Table 3.28-1 shows the fuel consumption rates for automobiles and multi-unit trucks used in TREDIS. TREDIS applies these fuel consumption efficiency rates for all analysis years.

In the United States British Thermal Unit (Btu) is used as a measure of heat energy. **Table 3.28-2** shows Btu content of one gallon of gasoline and diesel fuel¹. These energy unit values were used to estimate annual energy consumption for No-Build and build alternatives.

3.28.3 Analysis

Table 3.28-3 compares the energy consumption for No-Build and build alternatives. Annual VMT increases slightly for the build alternatives compared with the No-Build. One cause is changes in trip characteristics (e.g., # of trips, trip length, etc.) within the 12-County Study Area. Some of the increase in VMT for the build alternatives is due to external trips diverted into the Study Area which did not travel through the Study Area in the No-Build case. Such increase in VMT and energy consumption is offset by reductions outside of the Study Area.

Table 3.28-3 shows VMT and energy consumption is slightly higher for the build alternatives due to attracted trips from outside the study area and increases in the number and length of internal-internal and external-internal trips. Alternatives B, C and O have higher increases in VMT and energy consumption than Alternatives P or M. Alternatives

1 U.S. Energy Information Administration: Monthly Energy Review, May 2020



Alternatives	Auto			Truck			Btu/VMT Combined
Routes	Annual VMT (millions)	Daily Fuel Consumption (gallons)	Annual Btus (millions)	Annual VMT (millions)	Daily Fuel Consumption (gallons)	Annual Btus (millions)	
No Build	4,285	642,750	23,194,148	367	186,069	7,668,704	6,634
B Alternatives	4,310 - 4,317	646,500 - 647,550	23,329,470 - 23,367,360	371	188,097	7,752,286	6,638 - 6,640
C Alternatives	4315 - 4316	647,250 - 647,400	23,356,534 - 23,361,947	369 - 370	187,083 - 187,590	7,710,495 - 7,731,391	6,633 - 6,635
M Alternatives	4,300 - 4,302	645,000 - 645,300	23,275,341 - 23,286,167	368 - 369	186,576 - 187,083	7,689,599 - 7,710,495	6,633 - 6,635
O Alternatives	4,309 - 4,319	646,350 - 647,850	23,324,056 - 23,378,186	368 - 370	186,576 - 187,590	7,689,599 - 7,731,391	6,629 - 6,637
P Alternatives	4,298 - 4,305	644,700 - 645,750	23,264,515 - 23,302,405	368 - 369	186,576 - 187,083	7,689,599 - 7,710,495	6,634 - 6,635

Table 3.28-3: Changes in VMT, Fuel Consumption and Btu Usage

B, C and O have more indirect routes to I-69.

Table 3.29-4 shows percent changes in VMT and energy consumption between No-Build and build alternatives. It shows that overall percent changes in VMTs and energy consumptions between No-Build and build alternatives are small (generally, less than 1%). For reasons noted previously, Alternatives B, C and O show the largest percentage increase in VMT and energy consumption.

Alternatives	Auto		Truck	
Routes	% Change in VMT Compared to No-Build	% Change in Fuel Consumption Compared to No-Build	% Change in VMT Compared to No-Build	% Change in Fuel Consumption Compared to No-Build
No Build	N/A	N/A	N/A	N/A
B Alternatives	0.67	0.67	1.10	1.10
C Alternatives	0.71	0.71	0.68	0.68
M Alternatives	0.37	0.37	0.41	0.41
O Alternatives	0.68	0.68	0.54	0.54
P Alternatives	0.39	0.39	0.41	0.41

Table 3.28-4: Percent Changes in VMT, Fuel Consumption and Btu Usage

3.28.4 Summary

All build alternatives would have slightly higher VMT and energy consumptions within the Study Area compared to No-Build scenario. Increases in number of trips, trip lengths both within the 12-County Study Area and areas outside the study area contribute to slightly higher VMT and energy consumptions. Differences in VMT and energy consumption for the build alternatives are small. Increases are greatest for Alternatives B, C and O. Preferred Alternative P would have less than a 0.5% increase in fuel consumption compared to the No-Build scenario.

