# 3. Existing Conditions and **Environmental Consequences**



## 3.14 Energy

This chapter examines the existing energy use in the energy impact analysis area as well as the energy requirements of the Carolina Crossroads reasonable alternatives. Transportation energy is often evaluated in the form of vehicle fuel consumption, which varies with traffic characteristics. Traffic characteristics include the average vehicle speed, driver behavior, the geometric configuration of the highway, the vehicle mix, and climate and weather. The way one drives their car has a direct effect on fuel consumption. Speeding, rapid acceleration, and sudden braking are all common ways to waste fuel, lowering gas mileages by 15 to 30 percent at highway speeds.<sup>1</sup> Therefore, average vehicle speed causes variability in fuel consumption and is a good predictor of fuel economy. Fuel efficiency under steady-flow "cruising" driving conditions peaks at 50 miles per hour (mph) and then declines as speeds increase.<sup>2</sup>

#### 3.14.1 WHAT ARE THE EXISTING ENERGY CONSUMPTION CONDITIONS IN THE CORRIDOR?

In 2016, transportation accounted for approximately 29 percent of the energy used in the U.S.<sup>3</sup>, and the sources of that energy came predominantly from petroleum (92 percent), including gasoline - the dominant transportation fuel in the U.S. – diesel, and jet fuel.<sup>4</sup>

To determine existing energy use within the Carolina Crossroads corridor, existing (2015) average annual traffic in the peak periods for the interstate and primary arterial roadways was utilized. For existing conditions (2016, earliest available data), an average vehicle fuel efficiency of 32.8 miles per gallon (mpg) was used based on information from the U.S. Department of Energy<sup>5</sup>; this figure includes on-the-road estimates for both cars and light trucks. The average fuel efficiency was divided into the average annual peak period vehicle miles traveled (VMT) to determine the total fuel consumption per year in the peak period.

Share of total U.S. energy used for transportation, 2016



Energy Review, Table 2.1, April 2017, preliminary data

Table 3.14-1 shows the existing (2015) energy consumption in the Carolina Crossroads corridor.

Condition	Approximate peak period consumption in 2015 (gallons/year)
Existing (2015)	14,904

<sup>&</sup>lt;sup>1</sup> Oak Ridge National Laboratory. 2017. Sensible driving saves more gas than drivers think. https://www.ornl.gov/news/sensible-driving-saves-more-gasdrivers-think

<sup>&</sup>lt;sup>2</sup> U.S. Department of Energy. 2017. Driving More Efficiently. https://www.fueleconomy.gov/feg/driveHabits.jsp

<sup>&</sup>lt;sup>3</sup> U.S. Energy Information Administration (USEIA), Monthly Energy Review, Table 2.1. April 2017, preliminary data.

<sup>&</sup>lt;sup>4</sup> USEIA. Monthly Energy Review. Tables 2.5 and 3.8c. April 2017, preliminary data.

<sup>&</sup>lt;sup>5</sup> USEIA. Annual Energy Outlook, Table A7. 2018.



# 3.14.2 WHAT ARE THE EFFECTS OF THE REASONABLE ALTERNATIVES ON EXISTING ENERGY CONSUMPTION CONDITIONS IN THE CORRIDOR?

The methodology used to determine average annual VMT and energy consumption in 2040 is the same as that described in Section 3.15.1. To determine future energy use, based on implementation of the reasonable alternatives within the Carolina Crossroads corridor, future (2040) average annual traffic in the peak periods for the interstate and primary arterial roadways was utilized. Estimates for vehicle-miles per gallon was obtained from the U.S. Department of Energy and is projected to be 46.5 mpg<sup>6</sup>; this figure includes on-the-road estimates for both cars and light trucks. The average fuel efficiency was divided into the average annual peak period VMT to determine the total fuel consumption per year in the peak period. Each reasonable alternative was compared to the No-build alternative.

### 3.14.2.1 No-build Alternative

With the No-build alternative, the Carolina Crossroads project would not be constructed. With the No-build alternative, average annual peak period VMT in the Carolina Crossroads corridor in 2040 would decrease by approximately 2.5 percent over existing 2015 conditions, and related fuel consumption is projected to decrease by 31 percent (see Table 3.14-2).

Condition	Approximate peak period consumption in 2015 (gallons/year)	Percent increase over 2015
No-build (2040)	10,246	-31%

#### Table 3.14-2 Future (2040) Average Annual Vehicle Fuel Consumption, Peak Periods

### 3.14.2.2 Reasonable Alternatives

Both reasonable alternatives would increase overall average annual VMT and energy consumption during peak periods as a result of more trips being taken within the corridor when compared to the No-build alternative. These additional trips would be the result of more denied vehicles being able to access the system. This is a direct result of achieving the purpose and need to reduce congestion and improve mobility within the corridor. Overall, RA1 would increase energy consumption by approximately 33 percent compared to the No-build alternative; and RA5 Modified would increase energy consumption by approximately 31 percent compared to the No-build alternative (Table 3.14-3). The No-build would be more congested which would lead to greater fuel wastage than if you had free-flow conditions.

<sup>&</sup>lt;sup>6</sup> U.S Energy Information Administration. Annual Energy Outlook, Table A7. 2018

# 3. Existing Conditions and Environmental Consequences



#### Table 3.14-3 Future (2040) Average Annual Vehicle Fuel Consumption, Peak Periods

	Approximate peak period consumption in 2040 (gallons/year)	Percent increase over no-build
RA1 (2040)	13,651	33%
RA5 Modified (2040)	13,378	31%

Energy resources such as fuel and electricity will be consumed for the production of materials used for project construction and will be also be consumed during the construction of the project itself; however, the quantity of this energy resource consumption is unknown.

# 3.14.3 WHAT MITIGATION MEASURES WOULD BE TAKEN FOR ENERGY CONSUMPTION?

Since the primary purpose of the proposed project is to reduce congestion and improve mobility, no mitigation measures are proposed.

# 3. Existing Conditions and Environmental Consequences



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