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 project 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.[1] 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.[2]

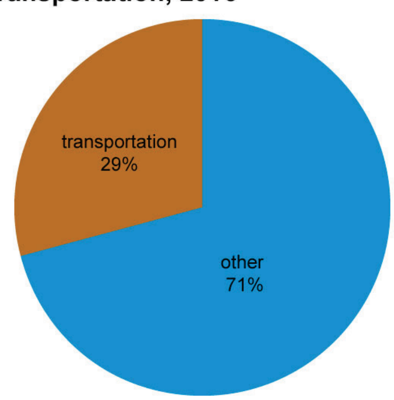
3.14.1 CHANGES TO THIS CHAPTER SINCE THE DEIS

Since the Draft Environmental Impact Statement (DEIS), the following updates have been made to this section: the discussion was updated to include the impacts from the Refined Recommended Preferred Alternative (RPA), and to add further explanation of the fuel consumption between the no-build and selected alternatives.

3.14.2 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.[3] , 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.[4]

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



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 2.1, April 2017, preliminary data

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[5]; 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.

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

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[1] Oak Ridge National Laboratory. 2017. Sensible driving saves more gas than drivers think. https://www.ornl.gov/news/sensible-driving-saves-more-gas-drivers-think
[2] U.S. Department of Energy. 2017. Driving More Efficiently. https://www.fueleconomy.gov/feg/driveHabits.jsp
[3] U.S. Energy Information Administration (USEIA), Monthly Energy Review, Table 2.1. April 2017, preliminary data.
[4] USEIA. Monthly Energy Review. Tables 2.5 and 3.8c. April 2017, preliminary data.
[5] USEIA. Annual Energy Outlook, Table A7. 2018.

Table 3.14-1 Existing (2015) Average Annual Vehicle Fuel Consumption, Peak Periods

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

3.14.3 WHAT WOULD BE THE EFFECTS OF THE RPA AND THE REFINED RPA 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 3.14.2. To determine future energy use, based on implementation of the RPA or the Refined RPA 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[6]; 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. The RPA and the Refined RPA were compared to the No-build alternative.

3.14.3.1 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). This is due to the additional congestion in the existing project corridor that would not allow for some drivers to be able to use the corridor. Rather, they would be forced to take alternate routes, thus lowering the VMT and the fuel consumption within the project corridor in 2040. In addition, drivers who are able to use the congested corridor would experience more stop and go conditions, resulting in additional fuel being wasted due to vehicle idling. The amount of fuel wasted due to idling vehicles cannot be quantitatively captured.

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

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

[6] U.S Energy Information Administration. Annual Energy Outlook, Table A7. 2018

3.14.3.2 RPA and the Refined RPA

The RPA and the Refined RPA 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 drivers 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, the RPA and the Refined RPA would increase energy consumption by approximately 33 percent compared to the No-build alternative (Table 3.14-3). However, both the RPA and the Refined RPA would allow for free-flow conditions, resulting in less idling vehicles, thus reducing the amount of fuel wasted. However, the amount of fuel saved due to the free flow conditions versus congested conditions cannot be quantitatively captured.

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
RPA or Refined RPA (2040)	13,651	33%

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

3.14.4 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.

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