11.0 Energy

11.1. Introduction

This chapter defines the energy resources pertinent to the Long Bridge Project (the Project), and defines the regulatory context, methodology, and Affected Environment. For each Action Alternative and the No Action Alternative, this chapter assesses the potential short-term and long-term impacts on energy resources. This chapter also discusses proposed avoidance, minimization, and mitigation measures to limit potential impacts of the Project.

Energy resources, as discussed in this chapter, refer to energy end-use, or consumption. The analysis divides energy use into operational and construction energy consumption. Energy sources in the analysis include electricity and other fuels as applicable, such as natural gas, gasoline, diesel fuel, and propane.

Operational energy consumption, for this Project, is a function of the following sources of energy consumption:

- The bridge itself, including lighting, signals, transportation sensors, communications equipment, and any other energy-consuming stationary equipment located on the bridge;
- Bridge and track maintenance equipment; and
- The trains running over the bridge.

Construction energy consumption consists of one-time or temporary energy use associated with the construction of the Project's physical infrastructure. The energy consumption in the analysis includes electricity and other fuel use related to construction vehicles, construction equipment, mobile generators, and any temporary structures used on the construction site.

11.2. Regulatory Context and Methodology

This section describes the most pertinent regulatory context for evaluating impacts to energy resources and summarizes the methodology for evaluating current conditions and the probable consequences of the alternatives. This section also includes a description of the Study Area. **Appendix D1, Methodology Report**, provides the complete list of laws, regulations, and other guidance considered and a full description of the analysis methodology.

11.2.1. Regulatory Context

The Federal Railroad Administration's *Procedures for Considering Environmental Impacts* require that the evaluation of impacts consider use of energy resources.[1] In addition, a number of policies, programs, and local guidance documents outline goals and objectives for reduced energy consumption throughout the built environment and transportation sectors. At the Federal, state, and local levels, these policies and guidance documents articulate the need to reduce dependence on foreign oil and increase energy efficiency with the benefits of reduced costs, improved air quality, and reduced greenhouse gas (GHG)

[1] 64 FR 28550

emissions. These documents include Executive Order (EO) 13783, *Promoting Energy Independence and Economic Growth*,[2] EO 13834, *Efficient Federal Operations*,[3] the *Sustainable DC Plan*,[4] the *Virginia Energy Plan*,[5] and the Arlington County *Community Energy Plan*.[6] The District of Columbia (the District) also has an engine anti-idling law.[7]

11.2.2. Methodology

The Local Study Area for energy resources includes the footprint of the Project Area and any staging or transport areas for construction near the Project Area (**Figure 11-1**). The analysis does not include a Regional Study Area for the Project. The No Action Alternative, Action Alternative A, and Action Alternative B do not have implications either currently or into the future for the regional energy grid. Energy use outside of fuel consumption by trains would be negligible for the Project and would not place any substantial demands on the local or regional grid.

The energy consumption impact analysis assessed the type of energy resources and the magnitude of their consumption on the existing Long Bridge to describe the existing 2017 direct energy use profile. The analysis based the energy consumption of the existing bridge on estimates of energy consuming equipment at each of the three interlockings involved in the Project and bridge. This equipment includes a small amount of lighting and signal equipment, such as those contained in signal bridges, central instrument houses, and location houses. The equipment consumes very little energy. The analysis assessed energy consumption for direct, indirect, and construction impacts for each alternative. Based on the most recently available energy consumption data for the railroad industry, the analysis established a profile of direct energy use for the No Action Alternative and for each Action Alternative for year 2040, by which time the Action Alternatives would be in operation. The analysis calculated energy use for train operations in the area of the bridge; construction equipment using the same data as **Chapter 10, Air Quality and Greenhouse Gas Emissions**; anticipated upgrades to on-bridge lighting and signaling equipment; and anticipated additions of lighting and maintenance associated with the bicycle-pedestrian crossing under the Action Alternatives. These analyses used reasonable assumptions as precise data was not available for quantifying energy consumption for these features.

---

[2] 82 FR 16093

[3] 83 FR 23771

[4] District Department of Energy and Environment; District Office of Planning; and Office of the Mayor. The Sustainable DC Plan. 2016. Accessed from http://www.sustainabledc.org/wp-content/uploads/2017/03/SDC_Plan_2016_compressed2.pdf. Accessed June 8, 2017.

[5] Virginia Department of Mines, Minerals, and Energy. October 1, 2014. The Virginia Energy Plan. October 1, 2014. Accessed from https://www.dmme.virginia.gov/DE/2014_VirginiaEnergyPlan2.shtml. Accessed May 16, 2018.

[6] Arlington County. Community Energy Plan. 2013. Accessed from https://environment.arlingtonva.us/energy/community-energy-plan-cep/. Accessed June 8, 2017.

[7] District of Columbia. Onroad Engine Idling and Nonroad Diesel Engine Idling. 2015. Accessed from https://dcregs.dc.gov/Common/DCMR/SectionList.aspx?SectionId=7740. Accessed October 19, 2018.

Figure 11-1 | Local Study Area for Energy Resources

The primary source used to estimate energy consumption of the trains is the Bureau of Transportation Statistics Energy Intensity of Class I Railroad Freight Service and Energy Intensity of Amtrak Services[8] and Oak Ridge National Laboratory Transportation Energy Data Book.[9] **Chapter 10, Air Quality and Greenhouse Gas Emissions**, addresses the GHG emissions impact of the energy consumed by trains and construction equipment.

11.3. Affected Environment

This section summarizes the existing conditions for energy consumption. For a complete description of the Affected Environment, see **Appendix D2, Affected Environment Report.**

The bridge infrastructure in the Local Study Area consumes a negligible amount of energy due to the amount of energy-consuming equipment on the bridge. In 2017, 76 trains per day traveled through the Corridor and over Long Bridge. The estimated annual consumption of energy on the bridge from bridge equipment is 1,420 million British Thermal Units (MMBtu), while the energy consumed by the trains—some freight and some passenger—is 31,449 MMBtu annually.

11.4. Permanent or Long-Term Effects

This section discusses the permanent or long-term effects following the construction of the No Action Alternative and Action Alternatives on energy resources within the Local and Regional Study Areas. For a complete description of the permanent or long-term effects, see **Appendix D3, Environmental Consequences Report**.

11.4.1. No Action Alternative

The No Action Alternative would have negligible permanent direct adverse effects on energy consumption in the existing Long Bridge Corridor. The No Action Alternative would maintain the existing Long Bridge Corridor, which consumes negligible energy for bridge lighting, signals, and other sensors and communication equipment (1,420 MMBtu). This amount would not change as a result of the No Action Alternative.

Vehicles and equipment used for ongoing maintenance of the bridge and railroad tracks would also consume energy. Improved equipment efficiency over time would likely cause some level of reduction in fuel consumption. Replacing lighting and signal equipment with newer, more efficient equipment would also reduce energy consumption.

Train operations in the Corridor would be the most substantial source of energy consumption. By 2040, railroad operators would run 112 trains compared to existing volumes of 76 trains (a 36-train difference), based on continuous growth in demand for freight service, which would consume 79,935 MMBtu compared to the existing 31,449 MMBtu (a 48,487-MMBtu difference). With the No Action Alternative, the trains may consume additional fuel as they would operate under more congested

---

[8] Bureau of Transportation Statistics. "Section 4.C – Transportation Energy Intensity and Fuel Efficiency." Accessed from https://www.bts.gov/topics/national-transportation-statistics. Accessed August 17, 2018.

[9] Oak Ridge National Laboratory. Transportation Energy Data Book: Edition 36.2 2018. Accessed from https://cta.ornl.gov/data/tedbfiles/Edition36_Chapter02.pdf. Accessed October 18, 2018.

conditions and not move efficiently through the Corridor. The additional trips and congestion would regionally increase demand for diesel energy. However, given the hundreds of billions of gallons of fuel consumed annually nationwide, this is a negligible amount, as these resources are not in short supply and are readily available. Also, the analysis expects that more energy efficient trains and equipment would come on line in the future. Increased congestion could shift freight from trains to trucks, increasing energy use by up to four times.[10]

11.4.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have minor permanent direct adverse impacts on energy consumption. Energy consumed by bridge lighting, signals, and other sensors or communication equipment would continue to be negligible. The total energy consumed by this new equipment is anticipated to be 2,713 MMBtu annually, a 1,293-MMBtu increase over the No Action Alternative. Given that national rail operations consume more than 500 trillion Btu annually (based on the most recent 2015 data),[11] and the District consumes 174 trillion Btu of energy, including 21 trillion Btu for the transportation sector, every year (based on the most recent 2016 data),[12] the additional energy demand generated by the new bridge can be accommodated by the energy grid and fuel supplies.

The vehicles and equipment used for ongoing maintenance of the bridges and rail tracks would also consume energy. While it is not possible to precisely quantify the amount of fuel required to operate this equipment, based on estimates, fuel consumption would approximately double for Action Alternative A compared to the No Action Alternative. Fuel consumption would double because Action Alternative A would require maintenance of two railroad bridges within the Local Study Area, instead of one railroad bridge as in the No Action Alternative. As with the on-bridge equipment, available fuel supplies can accommodate the additional fuel demand generated by the new vehicles, resulting in a negligible impact.

The most substantial source of energy consumption resulting from Action Alternative A is train operations in the Corridor, resulting in a minor adverse direct impact. While the Project itself does not include the operation of more trains, the additional tracks through the Corridor would enable railroad operators to increase operations and run additional trains as described in **Chapter 3.4, Alternatives, Train Volumes**. With Action Alternative A, 192 trains would move through the Project area, consuming 107,863 MMBtu per year. Therefore, the 80 additional trips (compared to the No Action Alternative) would regionally increase demand for diesel energy. However, given the hundreds of billions of gallons of fuel consumed annually nationwide, this is a small amount that would not affect the function of the resource, as these resources are not in short supply and are considered readily available. As a result, the use of these resources would be a minor adverse effect upon their continued availability. Further, the additional tracks would reduce idling time for trains waiting, increasing efficiency and reducing the diesel energy demand per train.

---

[10] CSXT. Fuel Efficiency. Accessed from https://www.csx.com/index.cfm/about-us/the-csx-advantage/fuel-efficiency/. Accessed October 18, 2018.

[11] Oak Ridge National Laboratory. *Transportation Energy Data Book: Edition 36.2 2018*. Accessed from https://cta.ornl.gov/data/tedbfiles/Edition36_Chapter09.pdf. Accessed October 18, 2018.

[12] U.S. Energy Information Administration. Table C1. *Energy Consumption Overview: Estimates by Energy Source and End-Use Sector, 2016*. 2016. Accessed from https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_sum/html/sum_btu_1.html&sid=US. Accessed October 18, 2018.

11.4.3. Action Alternative B

As a result of the on-bridge equipment and train operations would be the same for both Action Alternatives, the permanent or long-term energy consumption effects from Action Alternative B would be the same as for Action Alternative A.

11.5. Temporary Effects

This section discusses the direct or indirect temporary effects of the No Action Alternative and Action Alternatives during construction, based on conceptual engineering design. For the complete technical analysis of the potential temporary impacts to energy resources, see **Appendix D3, Environmental Consequences Report**.

11.5.1. No Action Alternative

The No Action Alternative would result in energy usage related to the construction of other projects such as the addition of a fourth track from AF to RO Interlockings in Virginia, the addition of a fourth track from L'Enfant (LE) to Virginia (VA) Interlockings in the District, the VRE L'Enfant Station Improvements, and the Virginia Avenue Tunnel project. The energy use related to the construction of these projects and any other large capital projects would be assessed and any required mitigation would be determined within the context of each project. While it is not possible to develop a quantitative estimate of energy usage, it is likely to include energy consumed by vehicles and equipment during construction.

11.5.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have negligible temporary direct adverse impacts to energy due to construction. Temporary effects for Action Alternative A related to energy include the energy consumed by vehicles and equipment during construction. Action Alternative A would require numerous trucks and other equipment that consume fuel throughout the course of their operation, most likely in the form of diesel fuel. At this level of design, the precise number of vehicle trips, distance traveled, or hours of operation are undetermined, but the analysis estimated fuel usage based on the construction data estimates in **Chapter 10.5, Air Quality and Greenhouse Gas Emissions Temporary Effects**. Those construction fuel usage estimates (gas and diesel) were converted to MMBtu using standard conversion factors and summed to estimate energy consumption from construction equipment. Energy consumption from construction vehicles and equipment would occur at varying levels throughout the 5-year construction duration for Action Alternative A. Construction equipment total energy use would be 184,799 MMBtu over the course of the entire construction period and 73,167 MMBtu during the most energy intensive construction year. These figures represent negligible amounts, considering that the District consumes 174 trillion Btu annually (based on most recent 2016 numbers), and the railroad sector consumes over 500 trillion Btu of energy annually (based on the most recent 2015 numbers). Therefore, adverse impacts would be negligible.

11.5.3. Action Alternative B

The temporary energy consumption effects from Action Alternative B would be similar to Action Alternative A for the most intensive energy consumption year because the activities would be equivalent under both Action Alternatives. Action Alternative B construction equipment total energy use would be 306,495 MMBtu over the course of the 8 years and 3 months–long construction period. These figures represent negligible amounts, considering that the District consumes 174 trillion Btu annually (based on most recent 2016 numbers), and the railroad sector consumes over 500 trillion Btu of energy annually (based on the most recent 2015 numbers). Therefore, adverse impacts would be negligible.

11.6. Avoidance, Minimization, and Mitigation

This section describes proposed mitigation for the impacts to energy resources.

The Virginia Department of Rail and Public Transportation (DRPT), the project sponsor for final design and construction, would use energy-efficient technologies wherever feasible in the operations of Long Bridge and construction activities to minimize adverse effects to energy resources. These technologies and anticipated continued improvements in energy efficiency would reduce energy use, normalized per piece of equipment or train mile traveled. These reductions would be associated with on-bridge equipment (for example, lighting), maintenance equipment, construction equipment, and trains, due to adoption of technologies such as LED lights and higher-efficiency engines. These energy efficiency improvements are anticipated to (partially) offset any energy consumption increases from the Project.

Temporary impacts during construction would primarily result from fuel consumed in vehicles and equipment. FRA and DDOT have strategically planned construction staging and access areas to minimize the distance traveled by construction vehicles or trucks hauling materials to or from the site. In addition, construction plans would emphasize minimizing, to the greatest extent possible, vehicle idling times in accordance with the District's anti-idling law. While some vehicles and equipment, such as cement mixers, may require ongoing engine use and are therefore exempt from the law, other applicable vehicles would adhere to this policy. The policy also would encourage contractors to use fuel efficient or alternative fuel vehicles to the greatest extent feasible. DRPT would consider solar-powered generators an alternative to diesel generators wherever feasible.