3.12 Energy

Federal, state, and local policies (as discussed in the Energy Technical Report) support energy conservation. Transportation energy efficiency is primarily regulated through vehicle efficiency requirements. There are no regulatory standards for transportation facility energy efficiency. Operational energy consumption was evaluated using Oregon Metro's regional travel demand model. The information presented in this section is based on the Energy Technical Report.

3.12.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with energy has been updated in this Draft SEIS to include:

- Revised methodology based on ODOT's updated Air Quality Manual and WSDOT's Guidance on Addressing Air Quality, Greenhouse Gas Emissions, and Energy for WSDOT projects.
- Updated data and models, such as the FHWA Infrastructure Carbon Estimator and the FTA Greenhouse Gas (GHG) Estimator to measure emissions and energy consumption from the construction and maintenance of transportation projects, and the U.S. Environmental Protection Agency's (EPA) latest version of MOtor Vehicle Emission Simulator (MOVES) that estimates emissions and energy consumption from on-road vehicles.
- Updated scenarios for electric vehicle assumptions.
- Change in transportation modeling and analysis.
- Changes to the project footprint, as necessitated by changed conditions, and in existing land uses resulting in changes to proximity to sensitive receptors.

Table 3.12-1. compares the impacts and benefits of the CRC LPA to those of the Modified LPA as a result of the changes listed above. Based on the analysis described in this section, the effects of the Modified LPA would be similar to those of the CRC LPA. Although the methodologies and units used to report energy use have changed since the CRC Final EIS, both the CRC LPA and Modified LPA would reduce energy consumption and GHG emissions.

Table 3.12-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Annual energy use during operations	Approximately 324,940 BTU of regional transportation energy consumption (mmBtu/day) [a]	Approximately 271,187 BTU of regional transportation energy consumption (mmBtu/day)	• Updates to the MOVES modeling tool, which includes fuel economy and fuel efficiency standards that have been adopted since 2011. • Changes in underlying assumptions about energy consumption from

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
			transit agencies. Values used for the CRC LPA were system-wide whereas values used for the Modified LPA are based on attributable changes.
Total GHG emissions during operations	Approximately 24, 746 metric tons/day (2030)	Approximately 26,325 metric tons/day (2045)	• Same as annual energy use during operations (above).
Vehicle Miles Traveled	Approximately 36.4 million (2030 9-hour regional VMT)	Approximately 58.9 million (2045 daily regional VMT)	• VMT for the CRC LPA was reported for a 9-hour period, whereas VMT for the Modified LPA is reported for a daily (24-hour) period. • Variations in methodology, such as the base year of analysis.
Construction impacts to energy consumption and GHG emissions	Approximately 11,447,104 mmBTU and 871,265 $MTCO_2e$	Approximately 2,601,017 mmBTU and a range of 412,627 to 469,444 $MTCO_2e$	• Updates to methodology and availability of FHWA Infrastructure Carbon Estimator

a CRC estimates on energy use are based on a different underlying assumption about energy consumption. CRC values are system-wide energy values based on data from transit agencies. IBR values are based only on changes due to the Program.

CRC = Columbia River Crossing; BTU = British thermal units; FHWA = Federal Highway Administration; GHG = greenhouse gas; IBR = Interstate Bridge Replacement; mmBTU = one million British thermal units; MOVES = MOtor Vehicle Emission Simulator; MTCO2e = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled

3.12.2 Existing Conditions

The energy analysis considered effects within the “traffic assignment area,” which is the area where the Modified LPA would affect vehicle traffic. The study area and traffic assignment area are shown in Figure 3.12-1.

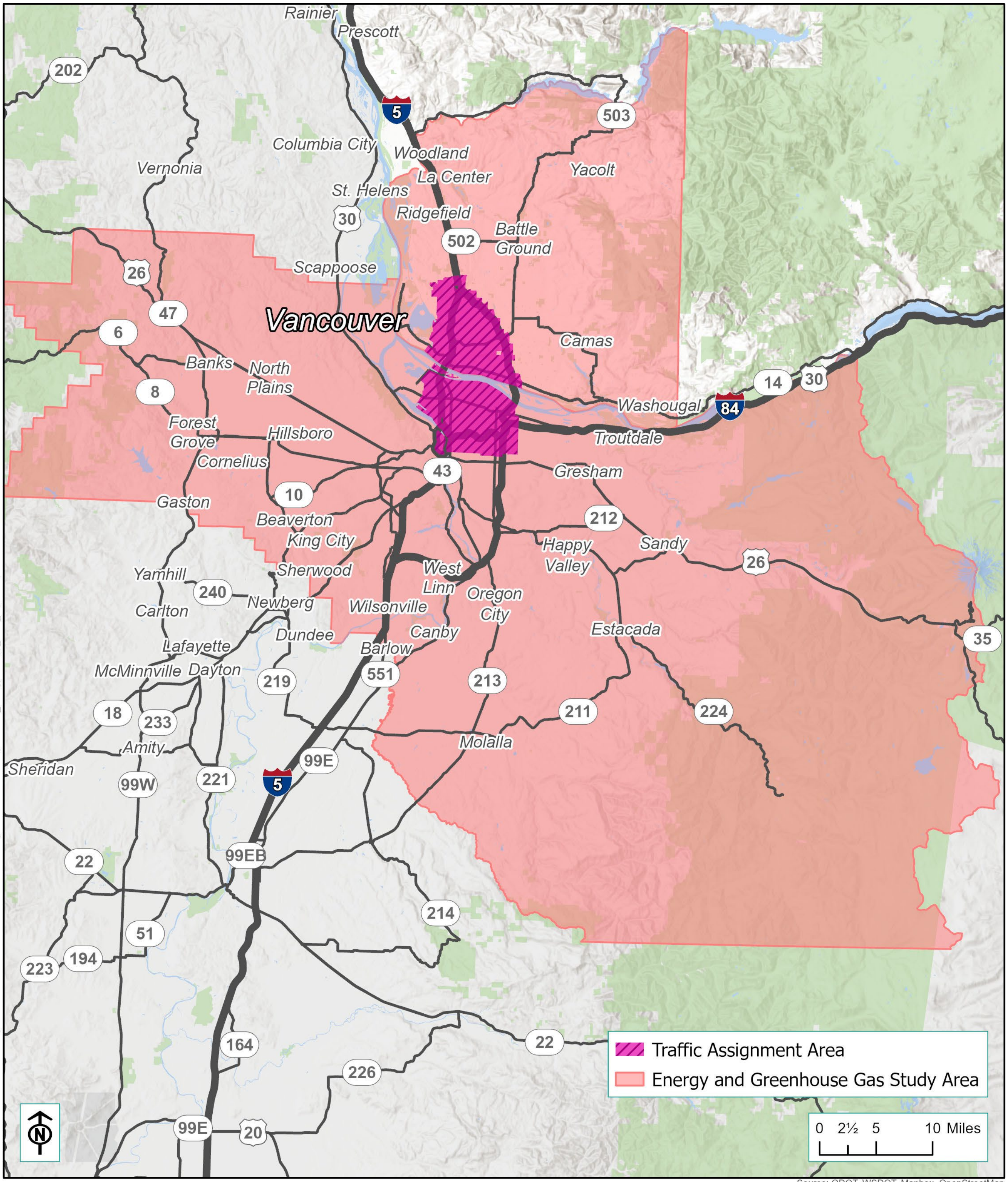
To represent existing conditions, energy consumption was estimated for the analysis year 2015; 2015 corresponds to the base year of the regional travel demand model that serves as the basis for the regional emissions analysis. More recent regional data was not available. The EPA MOVES model, version 3.1.0, was used to estimate energy consumption from the roadway links in the study area. Long-term effects to energy consumption from roadway maintenance, transit maintenance, and transit operations are demonstrated as an increase or decrease to a baseline condition; therefore, the energy consumption from existing roadway maintenance, transit maintenance, and transit operations in the study area were not quantified. The analysis for transit operations focused on new transit operations and stations that would be implemented as part of the Modified LPA.

National Energy Demand Projections

The U.S. Energy Information Administration projects that energy consumption in the transportation sector will remain lower than 2019 levels through 2050 because travel significantly decreased in 2020 as a result of

COVID-19 lockdowns and because improvements in fuel economy and a shift to electrification will offset projected resumed travel growth. As a result, energy consumption by light-duty and heavy-duty vehicles is projected to remain lower than 2019 levels through 2045.

Figure 3.12-1. Energy Study Area and Traffic Assignment Area



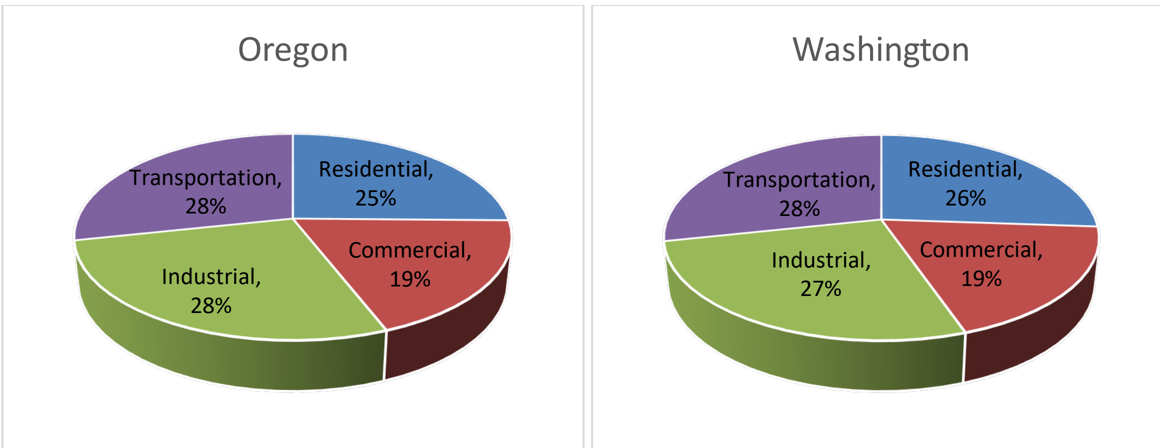
Date: 3/19/2024 Path: U:\Port\Projects\Clients\1585-WSP\274-1585-058 IBR Program\99Svcs\GIS\mapdocs\Ph_Energy\Energy_Tech_Figures.aprx

Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Washington and Oregon Energy Trends

Transportation accounts for a substantial portion of the energy consumed in Oregon and Washington—approximately 28% for both states (Figure 3.12-2). Petroleum (e.g., gasoline, diesel, and jet fuel) was the predominant source of transportation-related energy consumption in Oregon and Washington in 2020, at approximately 98% for each state. Natural gas and electric vehicles accounted for the remaining 2% of transportation energy consumption.

Figure 3.12-2. State Energy Consumption by End-Use Sector, 2020



Source: EIA 2022

In 2020, Oregon ranked 29th out of the 50 states for transportation energy consumption, with 279 trillion British thermal units (Btu) of transportation energy consumed, and 35th in transportation energy consumption per capita, at approximately 65.8 million Btu (EIA 2022). Washington ranked 18th in transportation energy consumption, with 505 trillion Btu of transportation energy consumed, and 38th in transportation energy consumption per capita, with about 65.4 million Btu consumed per capita in 2020.

3.12.3 Long-Term Benefits and Effects

This analysis compares the Modified LPA's potential adverse and beneficial effects to those of the No-Build Alternative, including the type and amount of energy consumed in construction and operation.

Table 3.12-2 summarizes the effects of the Modified LPA, design options, and No-Build Alternative on energy. Additional information is provided in the sections that follow.

Table 3.12-2. Summary of Energy Effects from the Modified LPA, the Design Options, and the No-Build Alternative

1	2	3	4	5	6	7
Effect	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5 or I-5 Westward Shift, All Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, Two Auxiliary Lanes, C Street Ramps, Centered I-5, All Park-and-Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration, [a] One Auxiliary Lane, C Street Ramps, Centered I-5, All Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One Auxiliary Lane, C Street Ramps, Centered I-5, All Park-and-Ride Site Options	Modified LPA with Double-Deck Fixed-Span Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5, All Park-and-Ride Site Options
Total Regional Transportation Energy Consumption (mmBtu/day)	• 271,933 in 2045 without electric vehicles. • 190,771 in 2045 with electric vehicles.	• 271,187 in 2045 without electric vehicles (-0.27% compared to No-Build Alternative). • 190,302 in 2045 with electric vehicles (-0.25% compared to No-Build Alternative).	• Similar to the effects listed in Column 3. Modeling results estimate a non-statistically significant difference of less than 0.1%.	• Similar to effects listed in Column 3, but would slightly reduce operational emissions due to the reduced profile grade of the new Columbia River bridges.	• Similar to effects listed in Column 5, except it would increase energy consumption due to the electricity required to raise and lower the bridge and as a result of idling that would be anticipated by a portion of the queued vehicles on the freeway during bridge closures.	• Similar to effects listed in Column 3, but would create additional congestion on local streets due to the removal of the C Street ramps, which would decrease vehicle efficiency, resulting in increased energy consumption.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options.

Energy consumption for the Modified LPA and the No-Build Alternative was estimated for 2045 using the travel demand model results, which includes consideration of shifts from vehicles to transit (Table 3.12-3). Carbon dioxide equivalent (CO_2e) was estimated as part of this analysis, and the results are presented in Section 3.19, Climate Change.

The EPA MOVES model, version 3.1.0, was used to estimate energy consumption and emissions of CO_2e from the study area roadway links. The MOVES model does not include assumptions about future electric vehicle use beyond what is included in federal fuel economy standards. However, by 2045 WSDOT and ODOT expect that the use of electric vehicles in Oregon and Washington will have increased substantially. To reflect the anticipated future use of electric vehicles, the Oregon Department of Environmental Quality provided MOVES input files and a post-processing methodology to create two scenarios comparing the No-Build Alternative and the Modified LPA: one with MOVES defaults for electric vehicles and one with assumptions about the region's transition to electric vehicles. The electric vehicle scenario assumes that by 2045, 52% of all passenger vehicles would be electric and thus would have zero tailpipe emissions of CO_2e. Increased adoption of electric medium-duty and heavy-duty trucks were also included. Emissions of CO_2e from electric vehicles were calculated based on estimates of the carbon intensity of the local power supply and estimates of the electricity needed to power an electric vehicle.

No-Build Alternative

Roadway and Transit Operations and Maintenance

Due to federal fuel and engine regulations, the energy efficiency of motor vehicles is expected to increase substantially over the next two decades. As a result, the energy consumed by roadway operations under the No-Build Alternative in 2045 would be lower than existing energy consumption (Table 3.12-3), despite an increase in annual VMT in the study area over this same period.

Table 3.12-3. Daily Energy Consumption in the Study Area and Traffic Assignment Area

Parameter	Existing (2015)	No-Build (2045) without Electric Vehicles	Modified LPA (2045) without Electric Vehicles	Modified LPA Difference from No-Build without Electric Vehicles	No-Build Alternative with Electric Vehicles (2045)	Modified LPA with Electric Vehicles (2045)	Modified LPA Difference from No-Build with Electric Vehicles
Daily Regional VMT [a]	43,017,600	59,042,000	58,950,700	-0.15%	59,042,000	58,950,700	-0.15%
Total Regional Transportation Energy Consumption (mmBtu/day)	290,732	271,933	271,187	-0.27%	190,771	190,302	-0.25%
Daily Traffic Assignment Area VMT	11,267,300	14,349,500	14,270,500	-0.55%	14,349,500	14,270,500	-0.55%

Parameter	Existing (2015)	No-Build (2045) without Electric Vehicles	Modified LPA (2045) without Electric Vehicles	Modified LPA Difference from No-Build without Electric Vehicles	No-Build Alternative with Electric Vehicles (2045)	Modified LPA with Electric Vehicles (2045)	Modified LPA Difference from No-Build with Electric Vehicles
Total Traffic Assignment Area Energy Consumption (mmBtu/day)	76,557	67,466	66,704	-1.13%	47,863	47,380	-1.01%

Note: Results from this table were generated using the MOVES model.

a Daily VMT represents regional link-level data provided by the IBR Program transportation analysts for the MOVES analysis. The VMT used for the MOVES analysis could be slightly different from the Regional VMT reported in the Transportation Technical Report due to differences in how VMT is allocated to specific roadway segments. Note that this daily VMT differs from the analysis for air quality, which evaluates a specific roadway network.

LPA = Locally Preferred Alternative; mmBtu = million British thermal units; VMT = vehicle miles traveled

The No-Build Alternative would not modify the energy consumption necessary for transit operations, roadway maintenance, or transit maintenance.

Modified LPA

Roadway Operations

Similar to the No-Build Alternative, compared to the existing condition VMT is expected to increase approximately 37% by 2045 under the Modified LPA; however, vehicle efficiency would lower estimated energy consumption within the region and within the traffic assignment area (Table 3.12-2).

Looking only at the traffic assignment area, 2045 energy consumption under the Modified LPA is estimated to decrease by approximately 1.01% compared to the No-Build Alternative. This is the same for the Modified LPA with the double-deck fixed-span configuration and the single-level fixed-span configuration (all bridge type options). The single-level movable-span configuration could increase energy consumption as a result of idling by queued vehicles on the roadways during bridge closures and potentially the energy required to raise and lower the bridge opening.

Compared to the Modified LPA with one auxiliary lane, the regional modeling results estimate a slight decrease in energy consumption with the Modified LPA with two auxiliary lanes. However, the decrease is not statistically significant (less than 0.03%). An additional analysis using an operational model output for changes in speed and congestion on the I-5 corridor show that energy consumption with the Modified LPA with two auxiliary lanes could decrease 0.5% compared to the Modified LPA with one auxiliary lane.

The Modified LPA without the C Street ramps at the I-5 and SR 14 interchange would result in additional congestion on local streets and increased energy consumption. Because this analysis is based on the regional travel demand model, this potential increase is not quantified. The Modified LPA with the centered I-5 mainline or mainline shifted west would have the same long-term energy consumption. All of the park and ride site options could equally encourage transit use, which was accounted for in the regional travel demand model and reflected in the energy consumption modeling results for the Modified LPA.

Energy consumption is different between the scenarios with and without electric vehicles because electric vehicles also require energy, but they shift the demand from petroleum to the electrical grid. The extension of Tri-County Metropolitan Transportation District (TriMet) and Clark County Public Transit Benefit Area

Authority (C-TRAN) service, the tolling of the river crossing, and active transportation would reduce overall VMT increases that would otherwise be anticipated from the added capacity associated with the Modified LPA.

Transit Operations

Energy consumption from transit operations would increase under the Modified LPA due to the increase in electricity needs for new transit vehicles, stations and park and ride facilities (Table 3.12-4). The additional energy needs for new transit vehicles and new transit facilities are less than 8% of the energy consumption from on-road vehicles. Energy consumption estimates in Table 3.12-4 reflect the new, additional energy needs for transit operations.

Table 3.12-4. Modified LPA Transit Operations Energy Consumption

Transit Element	Energy Consumption (mmBtu/year)
Light-Rail Vehicles	2,638
Transit Stations	1,146

Source: FTA Greenhouse Gas Emissions Estimator output model 2023 (available in the Energy Technical Report Appendix B)
mmBtu = million British thermal units

Roadway and Transit Maintenance

The annual energy consumption estimate for additional routine roadway maintenance (sweeping, restriping, and landscaping), transit vehicle maintenance, and light-rail track maintenance under the Modified LPA is approximately 11,000 million British thermal units (mmBtu) per year.

Collisions

The Modified LPA would meet current design standards and would decrease the level of traffic congestion, which would reduce collision frequency. During traffic incidents, new shoulders would be used for maintenance and emergencies, which would reduce congestion in the general purpose lanes. Reducing the congestion caused by collisions would in turn reduce energy consumption compared to the No-Build Alternative because of the reduction in idling traffic. This reduction in energy consumption was not quantified due to methodology constraints, which are described in more detail in the Energy Technical Report.

Bridge Openings

While there is no standard methodology to estimate how many drivers turn off their engines during a bridge opening, it is expected that at least a portion of drivers on the highway leave their vehicles idling during a bridge opening. Therefore, the Modified LPA with the double-deck fixed-span configuration and the single-level fixed-span configuration would be expected to reduce energy consumed by idling traffic during bridge openings. The Modified LPA with the single-level fixed-span configuration (all bridge type options) would further slightly reduce energy consumption due to the lower profile grade of the new Columbia River bridges (approximately 29 feet lower than the Modified LPA’s double-deck fixed-span bridge configuration). The Modified LPA with the single-level movable-span configuration would also reduce energy consumption with a lower profile grade; however, compared to the Modified LPA with the fixed-span configurations, the Modified LPA with the single-level movable-span configuration may include additional energy consumption from the electricity required to raise and lower the vertical lift, and the energy consumption from idling vehicles would be similar to the No-Build Alternative.

3.12.4 Temporary Effects

No-Build Alternative

The No-Build Alternative does not propose construction of new transportation facilities. Accordingly, no definable construction energy consumption is associated with the No-Build Alternative.

Modified LPA

Construction of the Modified LPA would include construction of the new bridges and removal of the existing Interstate Bridge. Using FHWA's Infrastructure Carbon Estimator (ICE) modeling tool, Table 3.12-5 presents estimated construction energy consumption for the Modified LPA over the construction period. The Modified LPA with two auxiliary lanes would have a wider I-5 roadway (approximately 4% larger total pavement area), resulting in an increase in energy consumption during construction compared to the Modified LPA with one auxiliary lane. However, the ICE modeling tool is a planning-level tool that cannot capture the quantity of this increase for this analysis.

Table 3.12-5. Modified LPA Energy Consumption from Construction Activities

Project Element	Total Energy Consumption (mmBtu)
Materials	2,244,692
Transportation	107,794
Construction	248,531
Total	**2,601,017**

Source: FHWA Infrastructure Carbon Estimator (ICE) model output 2023 (available in the Energy Technical Report Appendix A)
a Values calculated from the ICE model
mmBtu = million British thermal units

Design data are not available at a level of detail required to estimate the potential construction-related energy consumption among design options. Design options that require a greater volume of materials (e.g. the single-level movable-span configuration) would require a greater amount of energy to power additional construction equipment; however, design data to needed determine the material volumes and associated equipment use would not be available until final design.

3.12.5 Indirect Effects

The energy analysis of the Modified LPA is based on travel demand modeling that includes expected growth and planned projects in the region, including growth facilitated by the Modified LPA consistent with local and regional land use plans (see Section 3.4.4). The Modified LPA is not expected to create other effects that would cause indirect impacts to energy use and GHG emissions. Energy consumption could be affected by induced changes in patterns of land use, population density, or population growth rate. Land use changes would be expected to occur in compliance with local land use plans. Section 3.4, Land Use and Economics, evaluates the potential for induced land use growth associated with the Modified LPA.

3.12.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

State-level legislation and policy in Oregon and Washington support reducing emissions from transportation to minimize contributions to climate change; however, there are no specific requirements for mitigation in federal, state, or local regulations. The Program supports state, regional, and local goals to reduce GHG emissions. To help facilitate a shift from single-occupancy vehicles, the Program would improve multimodal transportation options, including:

- Extended light-rail
- Expanded active transportation facilities
- Demand management (e.g., variable-rate tolling)
- Operation and maintenance efficiencies

Program-Specific Mitigation

- Use energy-efficient electrical systems for transit stations and other electrical needs to decrease energy consumption.

Temporary Effects

Regulatory Requirements

- In Oregon, comply with ODOT Standard Specifications Section 290.
- In Washington, company with WSDOT Standard Specifications Division 1-07.

Program-Specific Mitigation

- All work in Washington and Oregon will follow the WSDOT Environmental Manual, Chapter 425: Air Quality, Energy, and Greenhouse Bases, including:
  - Minimize delays to traffic during peak travel times.
  - Minimize unnecessary idling of on-site diesel construction equipment.
  - Educate vehicle operators to shut off equipment when not in active use to reduce emissions from idling.
  - Prepare a traffic control plan with detours and strategic construction timing (e.g., night work) to move traffic through the area and reduce backups and delays to the traveling public to the extent practicable.
- Continue to consider advances in energy-reducing and/or energy-saving materials and methods.