3.12 Energy

Operational energy consumption from vehicles was evaluated using the Oregon Metro/Southwest Washington Regional Transportation Commission 2018 Regional Transportation Plan Regional Travel Demand Model (Metro/RTC 2018 RTP RTDM). Operational energy consumption was also estimated for proposed transit stations and light rail vehicles. Construction-related energy consumption was estimated from the energy used by construction equipment. The information presented in this section is based on the Energy Technical Report (as listed in Appendix H).

The assessment of reasonably foreseeable effects in this section is based upon the temporal proximity parameters detailed in the Chapter 3 introduction, and the energy study area and traffic assignment area described in Section 3.12.2.

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 (LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment near the Interstate Bridge, community priorities, and regulations have changed, which necessitated design revisions and resulted in the proposed IBR Program Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with energy has been updated in this Final SEIS to include:

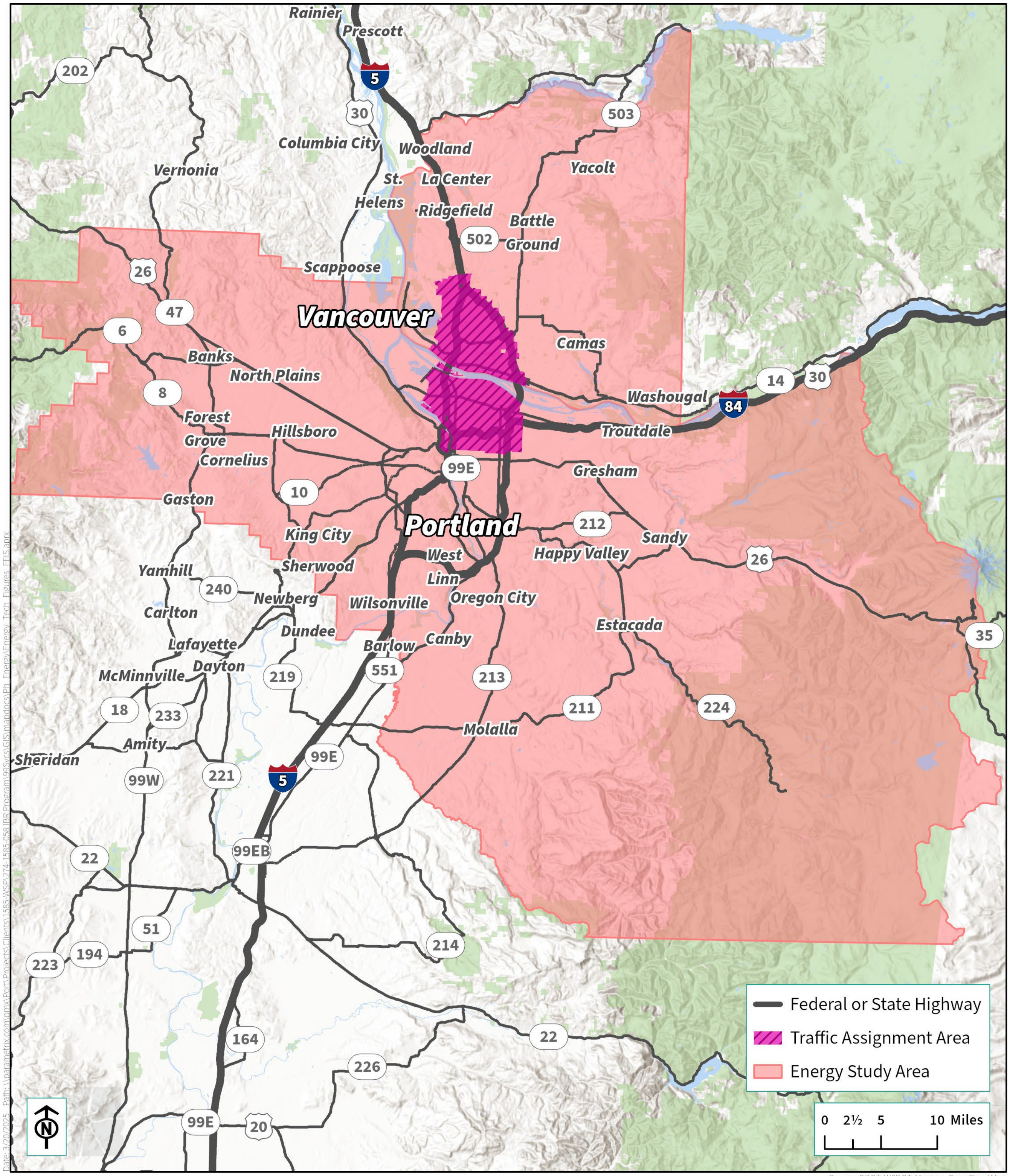
- Revised methodology based on ODOT's updated *Air Quality Manual* and WSDOT's *Air and Energy Analysis Triggers Flowchart.*
- Change in transportation modeling and analysis.
- Changes to the project footprint, as necessitated by changed conditions, and in existing land uses resulting in changes to proximity to sensitive receptors.

3.12.2 Existing Conditions

Reasonably foreseeable effects on energy were evaluated for the regional roadway network and the proposed transit alignment and facilities based on the boundaries of the Metro/RTC 2018 RTP RTDM, which encompasses Multnomah, Clackamas, Washington, and Clark Counties. To estimate the Modified LPA's reasonably foreseeable effects on a smaller scale, energy consumption was also calculated using only the traffic segments in the traffic assignment area, as described in Section 3.1, Transportation. The energy 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, as described in Chapter 3.1, Transportation; 2015 corresponds to the base year of the Metro/RTC 2018 RTP RTDM that serves as the basis for the regional energy 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 energy study area. Reasonably foreseeable 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 energy 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.

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



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

3.12.3 Long-Term Benefits and Reasonably Foreseeable Effects

This analysis compares the potential Modified LPA's reasonably foreseeable adverse and beneficial effects to those of the No-Build Alternative, including the type and amount of energy consumed in construction and operation. The energy study area and traffic assignment area described in Section 3.12.2 and the temporal scope described in the Chapter 3 introduction are used to assess long-term benefits and reasonably foreseeable effects to energy.

Table 3.12-1 summarizes the effects of the Modified LPA, design options, and No-Build Alternative on energy. Additional information is provided in the sections that follow.

Energy consumption for the proposed 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 3.12-2).

The EPA MOVES model, version 3.1.0, is an air quality assessment tool that reflects federal fuel economy standards but the data can also be used to estimate vehicle energy consumption. The IBR Program used MOVES data to estimate energy consumption by vehicles on the energy study area roadway links.

No-Build Alternative

Roadway and Transit Operations and Maintenance

MOVES3.1.0 assumes the energy efficiency of motor vehicles is expected to increase substantially over the next two decades due to federal fuel and engine regulations in place at the time of the model's development in 2020 and is the basis for the results found in Table 3.12-2. On December 3, 2025, the National Highway Traffic Safety Administration announced a notice of proposed rulemaking that would amend existing Corporate Average Fuel Economy (CAFE) standards for light-duty vehicles for model years 2022-2026 and 2027-2031. These proposed CAFE standards have not been reflected in MOVES.

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

Table 3.12-1. Long-term Energy Effects

0	1	2: IBR Program Recommended Design Options	3	4	5	6
Effect	No-Build Alternative	Modified LPA with Single-Level Fixed-Span Bridge Configuration,[a] One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides	Modified LPA with Double-Deck Fixed-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides	Modified LPA with Single-Level Fixed-Span Bridge Configuration, Two Auxiliary Lanes, with C Street Ramps, Centered I-5, and All Five Park and Rides	Modified LPA with Single-Level Movable-Span Bridge Configuration, One Auxiliary Lane, with C Street Ramps, Centered I-5, and All Five Park and Rides	Modified LPA with Double-Deck Fixed-Span Bridge Configuration, One Auxiliary Lane, Without C Street Ramps, Centered I-5, and All Five Park and Rides
Total Regional Transportation Energy Consumption (mmBtu/day)	• 271,933 in 2045	• 271,187 in 2045 (-0.27% compared to No-Build Alternative)	The double-deck fixed-span bridge configuration design option would have total regional transportation energy consumption impacts similar to those described in Column 2 for the single-level fixed-span bridge configuration design option, except: • Would slightly increase operational energy consumption due to the increased profile grade of the new Columbia River bridges.	• The two auxiliary lane design option would have total regional transportation energy consumption impacts similar to those described in Column 2 for the one auxiliary lane design option. Modeling results estimate a non-statistically significant difference of less than 0.1% due to the second auxiliary lane.	The single-level movable-span bridge configuration design option would have total regional transportation energy consumption impacts similar to those described in Column 2 for the single-level fixed-span bridge configuration design option, except:	The double-deck fixed-span bridge configuration and Without C-Street Ramps design options would each have total regional transportation energy consumption impacts similar to those described in Column 2 for the single-level fixed-span bridge configuration and With C-Street Ramps design options, except:

0	1	2: IBR Program Recommended Design Options	3	4	5	6
					• It would slightly 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.	• It 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.

Note: The underlined design options shown in columns 3 through 5 identify the specific effects on energy for that particular design option compared to the Modified LPA with Recommended Design Options (column 2). For example, the effects of two auxiliary lanes (column 4) would occur with any other combination of the C Street ramps, I-5 alignment, bridge configuration, and park and ride design options.

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

I-5 = Interstate 5; mmBtu/day = million British thermal units per day

Table 3.12-2. Daily Energy Consumption in the Energy Study Area and Traffic Assignment Area

Parameter	Existing (2015)	No-Build (2045)	Modified LPA (2045)	Modified LPA Difference from No-Build
Daily Regional VMT [a]	43,017,600	59,042,000	58,950,700	-0.15%
Total Regional Transportation Energy Consumption (mmBtu/day)	290,732	271,933	271,187	-0.27%
Daily Traffic Assignment Area VMT	11,267,300	14,349,500	14,270,500	-0.55%
Total Traffic Assignment Area Energy Consumption (mmBtu/day)	76,557	67,466	66,704	-1.13%

Results from this table were generated using the MOVES model. Results were developed assuming the current fuel mix is consistent into the future.

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 (as listed in Appendix H) 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/day = million British thermal units per day; VMT = vehicle miles traveled

Modified LPA

Roadway Operations

Similar to the No-Build Alternative, VMT is expected to increase approximately 37% by 2045 under the proposed Modified LPA as compared to the existing condition; however, the improved vehicle efficiency assumed in the MOVES tool 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 proposed Modified LPA is estimated to decrease by approximately 1.01% compared to the No-Build Alternative. This is the same for the proposed Modified LPA with the double-deck fixed-span bridge configuration design option and the single-level fixed-span bridge configuration design option (all bridge type options). The single-level movable-span bridge configuration design option could increase energy consumption as a result of idling by queued vehicles on the roadways during bridge closures and raising and lowering the bridge opening.

Compared to the proposed Modified LPA with one auxiliary lane, the regional modeling results estimate a 0.01% decrease in energy consumption with the proposed Modified LPA with two auxiliary lanes. An additional analysis using an operational model output for changes in speed and congestion on the I-5 corridor shows a 0.4% decrease in energy consumption with the proposed Modified LPA with two auxiliary lanes. Both results are within the error margins of their respective models.

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, therefore, increased energy consumption but the impact is not quantifiable because this analysis is based on the Metro/RTC 2018 RTP RTDM, which does not simulate intersection-level congestion. The Modified LPA with the centered I-5 mainline or I-5 westward shift would have the same long-term energy consumption because the vehicle operations on the roadway would not be affected by the change in location. Any of the park and rides could equally encourage transit use, which was accounted for in the Metro/RTC 2018 RTP RTDM and reflected in the energy consumption modeling results for the Modified LPA.

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 rides (Table 3.12-3). Energy consumption from increased express bus service was included in the roadway operations estimates. The additional energy needs for new transit vehicles and new transit facilities are less than 8% of the energy consumption by on-road vehicles under the proposed Modified LPA. Energy consumption estimates in Table 3.12-3 reflect the new, additional energy needs for transit operations.

Table 3.12-3. Modified LPA Transit Operations Energy Consumption

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

Source: FTA 2023 (available in Appendix B of the Energy Technical, as listed in Appendix H)
mmBtu/year = million British thermal units per year

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 proposed 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. The new shoulders would be used for maintenance and emergencies during traffic incidents, 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 Section 4.2 of the Energy Technical Report (as listed in Appendix H).

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 bridge configuration design option and the single-level fixed-span bridge configuration design option would be expected to reduce energy consumed by idling traffic due to the lack of bridge openings. The Modified LPA with the single-level fixed-span bridge configuration design option (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 design option). The Modified LPA with the single-level movable-span bridge configuration design option would also reduce energy consumption with a lower profile grade; however, compared to the Modified LPA with the fixed-span bridge configuration design options, the Modified LPA with the single-level movable-span bridge configuration design option 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. The Metro/RTC 2018 RTP RTDM does not account for non-recurring congestion, including bridge closures or openings; therefore, the effects on vehicle energy consumption were not quantified.

Future Development

As described Section 3.4, Land Use and Economic Activity, the Modified LPA, under any of the design options, could encourage development, particularly in light-rail station areas, due to local land use plans and improved bicycle, pedestrian, highway, and transit access in Portland and Vancouver. Such development could generate additional traffic, which would increase energy consumption by vehicles using the roadways; however, the Modified LPA would provide additional transportation options such as transit and nonmotorized facilities so any increase in energy use is expected to be minor.

3.12.4 Temporary Reasonably Foreseeable Effects

The energy study area and traffic assignment area described in Section 3.12.2 and the temporal scope described in the Chapter 3 introduction are used to assess temporary reasonably foreseeable effects to energy.

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

Reasonably foreseeable temporary effects on energy would be similar among the Modified LPA design options, unless noted otherwise below. Construction of the Modified LPA would include construction of the new bridges and removal of the existing Interstate Bridge. Using the Infrastructure Carbon Estimator (ICE) modeling tool, Table 3.12-4 presents estimated construction energy consumption for the Modified LPA over the construction period by project element. Materials includes the production of construction materials, transportation refers to the energy associated with fuel used to transport materials to the project site, and construction refers to energy used by construction equipment.

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 bridge configuration design option) would require a greater amount of energy to power additional construction equipment; however, design data needed to determine the material volumes and associated equipment use would not be available until final design.

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 3.12-4. Modified LPA Energy Consumption from Construction Activities

Project Element	Total Energy Consumption (mmBtu)
Materials[a]	2,241,688
Transportation	107,681
Construction	247,456
Total	2,596,826

Source: Infrastructure Carbon Estimator (ICE) model output 2023 (available in Appendix A of the Energy Technical Report, as listed in Appendix H).
a Model limitations do not allow the ability to quantify individual material production energy consumption values.
Totals may vary due to rounding.
LPA = Locally Preferred Alternative; mmBtu = million British thermal units

3.12.5 Intentionally Left Blank

3.12.6 Avoidance, Minimization, and Mitigation Measures

Table 3.12-5 lists temporary and long-term regulatory avoidance and minimization measures. Table 3.12-6 lists temporary mitigation measures. No long-term mitigation measures within control of the IBR program were identified.

Table 3.12-5. Avoidance and Minimization Measures

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Temporary	Energy consumption by vehicles and equipment during construction	In Oregon, ODOT will comply with ODOT Standard Specifications Section 290. In Washington, WSDOT will comply with WSDOT Standard Specifications for Roads, Bridge, and Municipal Construction, Section 1.07.5(4).
Temporary	Increase in energy usage from vehicle idling, backups, and traffic delays	ODOT and WSDOT will coordinate with the contractor to ensure that all work in Washington and Oregon will follow applicable state policies and procedures 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. • 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.

Temporary or Long-Term	Impact Type	Avoidance and Minimization Measure
Long-Term	Energy consumption from highway and transit operations including lighting and other components	ODOT and WSDOT will coordinate with TriMet and C-TRAN to use energy-efficient electrical systems for lighting, transit stations, and other electrical needs to decrease energy consumption, where feasible.

Table 3.12-6. Mitigation Measures

Temporary or Long-Term	Impact Type	Mitigation Measure
Temporary	Energy consumption during construction	As feasible, ODOT and WSDOT will coordinate with the contractor to continue to consider advances in energy-reducing or energy-saving materials and methods including: • Sourcing building and paving materials from local sources that require shorter distances for transport to the project site. • In-place recycling of asphalt surfaces. • Warm-mix asphalt technologies. • Other innovative methods that encourage use of recycled materials.

ODOT = Oregon Department of Transportation; WSDOT = Washington State Department of Transportation