Precipitation Changes

Because precipitation is expected to come in the form of in more severe storms, infrastructure design should plan for a wider range of water volumes and the possibility of higher and more frequent floods. Stormwater facilities should be sized to accommodate anticipated future storm frequencies and volumes. During construction, cut slopes should be protected from small landslides, especially during the winter months. Transit commuters may need additional shelter when waiting for trains, and active transportation commuters may need shelter on the bridge crossing. Infrastructure design should also consider the need for snow and ice removal, as increased winter storms may bring higher frequencies of freezing precipitation. Greater changes in river levels may also pose challenges to navigation, as there will likely be days when the Columbia River may be too high to accommodate vessels that might otherwise pass underneath fixed-span bridges; movable-span bridges may require more bridge openings if water levels are higher.

Other Climatic Factors

In addition to temperature and precipitation changes, climate change also has implications for wildfire risk and sea level rise. While the wildfire risk is unlikely to damage infrastructure associated with the Modified LPA, because of its materials and location, landscape designs should consider the possibility of sparks from vehicles igniting plantings during dry, hot summer weather. Exposure to wildfire smoke is a health threat, particularly to people directly exposed to the elements such as active transportation users, transit passengers, or construction workers (Grant and Runkle 2022). Sea level rise is a consideration on the coast, and the Columbia River is tidally influenced at the Interstate Bridge location. However, the resulting changes in water level are expected to be dwarfed by the seasonal changes from precipitation; the highest tidal swings are likely to occur when the Columbia River is relatively low. Saltwater intrusion is also not a cause for concern, according to the latest modeling from the OHSU Center for Coastal Margin Observation and Prediction (Baptista 2018).

3.19.4 Federal Policy Context for Climate

Federal regulations and policies guide the development and evaluation of transportation projects and local communities' management of GHG emissions. The federal government has issued direction to address climate in NEPA documents. In recognition of the urgency of the climate crisis and NEPA's important role in providing critical information to decision-makers and the public, CEQ issued interim guidance to agencies involved in federal actions in January 2023. The CEQ guidance directs federal agencies to do the following:

- Consider GHG emissions in the identification of proposed actions and alternatives.
- Quantify a proposed action's projected GHG emissions or reductions for the expected lifetime of the action.
- Place GHG emissions in context and disclose relevant GHG emissions and climate impacts.
- Identify alternatives and mitigation measures to avoid or reduce GHG emissions.
- Provide additional context for GHG emissions to allow decision-makers and the public to understand tradeoffs associated with an action, including through the use of the best available social cost of GHG estimates.
- Incorporate environmental justice considerations into their analysis of climate-related effects.
- Use the information developed during the NEPA review to consider reasonable alternatives that would make the actions and affected communities more resilient to the effects of changing climate.

The IBR Program has followed the CEQ guidance and outlined a strategy for addressing climate change in the planning, design, construction, and operation of the Modified LPA. Data used to support the climate analyses

were derived from the analysis in the Transportation Technical Report (for vehicle miles traveled [VMT] and mode shift estimates) and the Energy Technical Report for estimates of GHG emissions associated with construction and operation of the Modified LPA.

3.19.5 Washington and Oregon Policy Context for Climate

Washington and Oregon, along with their local agency partners, have policy directives to reduce GHG emissions from transportation and other activities and have developed energy transition plans. Reducing emissions to the targets established by these entities will require aggressive action at all levels of government and by private industry.

Washington and Oregon have policies intended to promote a shift away from GHG emissions in the transportation sector. These transportation-related transition policies are summarized in Table 3.19-2.

Table 3.19-2. Washington and Oregon Transportation Transition Policies

Policy	Policy Directives
WSDOT Strategic Plan: Resilience Goal – Washington State Department of Transportation (WSDOT n.d.)	WSDOT will plan and/or invest resources to improve the ability to mitigate, prepare for, and respond to emergencies; combat climate change; and build a transportation system that provides equitable services, improves multimodal access, and supports Washington's long-term resilience.
Washington Governor's Executive Order 20-01: State Efficiency and Environmental Performance (2020)	When making purchasing, construction, leasing, and other decisions that affect state government's emissions of GHGs or other toxic substances, agencies shall explicitly consider the benefits and costs (including the social costs of carbon) of available options to avoid those emissions.
Climate Commitment Act – Washington State Department of Ecology (Ecology n.d.)	Directed by Washington State Legislature to design and implement a cap-and-invest program to reduce statewide GHG emissions. This program works by setting an emissions limit, or cap, and then lowering that cap over time to ensure Washington meets the GHG reduction commitments set in state law (95% reduction of GHGs by 2050).
Washington Clean Vehicles Program (Chapter 173-423 WAC)	Adopt California's Heavy-Duty Engine and Vehicle Omnibus rules. 100% of sales of light-duty vehicles sold in Washington will be electric by 2035. Requires increasing the number of new ZEVs sold in Washington until all new vehicles meet the ZEV standard starting in 2035.
Washington Clean Fuels Program (RCW 70A.535)	Requires fuel suppliers to reduce the carbon intensity of transportation fuels to 20% below 2017 levels by 2038.
Washington Clean Energy Transition Act (UTC n.d.)	100% of electricity sold in Washington will be renewable by 2045.
Oregon Climate Protection Program (DEQ 2021a)	50% reduction by 2035 and 90% reduction by 2050 in emissions for covered fossil fuel suppliers (from 2017–2019 average emissions).

Policy	Policy Directives
Oregon Clean Fuels Program (DEQ 2022)	10% reduction in average carbon intensity for transportation fuels by 2025; 20% reduction by 2030; 37% reduction by 2035. In March 2020, Governor Brown issued Executive Order 20-04 to amend low-carbon fuel standards and schedule to phase in implementation with the goal of 20% below 2015 levels by 2030, 25% below 2015 levels by 2035. (The Oregon Clean Fuels Program Expansion was adopted by the Environmental Quality Commission in October 2022 and is effective as of January 1, 2023.)
Oregon Clean Energy Targets (DEQ n.d. d)	Targets for reducing GHG emission from electricity in Oregon from baseline (average annual emissions for 2010, 2011, and 2012): • 80% below baseline emissions by 2030. • 90% below baseline emissions by 2035. • 100% below baseline emissions by 2040.
Oregon Zero Emission Vehicle (ZEV) (Senate Bill 1044) (ODOE n.d.)	At least 250,000 registered motor vehicles will be ZEV by 2025. At least 25% of registered motor vehicles, and at least 50% of new motor vehicles sold annually, will be ZEV by 2030. At least 90% of new motor vehicles sold annually will be ZEV by 2035.
Oregon Clean Car Standards (DEQ n.d. c) and Advanced Clean Cars II (DEQ n.d. a)	The Oregon Department of Environmental Quality (DEQ) is beginning a rulemaking process to adopt California's Advanced Clean Cars II rule, which would require all light-duty vehicle sales in Oregon to be zero emission by 2035.
Oregon Clean Truck Rules 2021 (DEQ n.d. b) and Advanced Clean Trucks (DEQ 2021b)	Requires manufacturers of medium- and heavy-duty vehicles to sell a certain percentage of ZEVs beginning with 2024 vehicle model year: • 75% zero-emission sales for Class 4-8 rigid trucks by 2035. • 55% zero-emission sales for Class 2b-3 pickup trucks and vans by 2035. • 40% zero-emission sales for Class 7-8 tractor trucks by 2035.

GHG = greenhouse gas; WSDOT = Washington State Department of Transportation; ZEV = zero emissions vehicle

3.19.6 Existing Emissions Sources

User Emissions

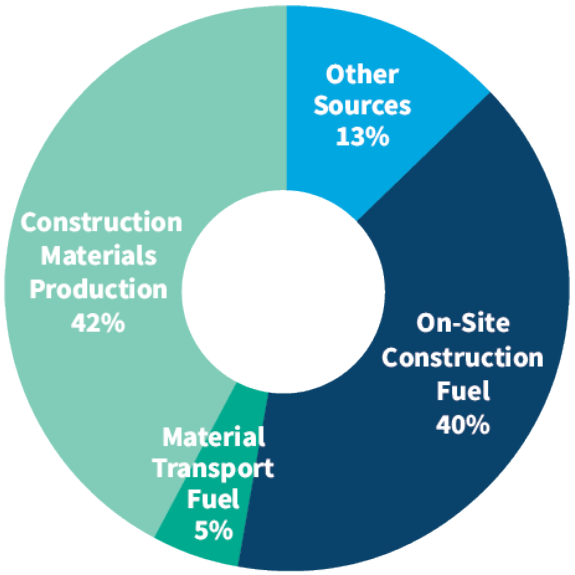
Emissions from vehicles using transportation facilities comprise the transportation sector's majority of GHG emissions. In a case study of six state departments of transportation, the National Cooperative Highway Research Program found that user emissions by passenger and freight vehicles made up approximately 94% of transportation-related emissions, compared with only 6% percent and 0.2% coming from construction and maintenance of the system and administrative functions (e.g., office buildings), respectively. Thus, reducing user emissions provides the greatest potential to make large reductions in total transportation-related emissions.

Across the U.S. transportation sector, roadway users account for over 80% of transportation emissions, with light-duty vehicles (passenger cars and trucks) producing the majority (57%) and medium- and heavy-duty trucks adding 26%. Of vehicle types, single-occupant light-duty trucks (which include the sport-utility vehicle class) are the least efficient mode, and they are a continuously growing share of the personal vehicle fleet.

Construction Emissions

Although construction emissions represent a smaller proportion of transportation sector GHG emissions, construction still produces substantial quantities. Figure 3.19-2 represents the average proportion of GHG emissions by category for the construction of transportation structures, highways, and streets per dollar spent.

Figure 3.19-2. Sources of Greenhouse Gas Emissions from Construction (USEPA)



Source: NCHRP 2023. For data sources, see footnote. [1]

The two largest categories of emissions are fuels used by construction equipment and production of construction materials (EPA 2023). These categories provide the greatest opportunities for minimizing GHG emissions from construction activities. Construction material production includes concrete, asphalt, and steel products. The largest emissions in this category come from cement and concrete products and asphalt concrete pavement, including binders and aggregate. The remainder of construction-related GHG emissions come from fuel used in transporting materials and from other sources (e.g., engineering services, waste disposal).

3.19.7 Summary of Climate Benefits

Modified LPA and GHG Emissions

The IBR Program proposes changes to the regional transportation system with the Modified LPA that would expand transit and institute tolling, which could encourage people to choose transportation modes other than driving alone (referred to as “mode shift”). and the program would also reconfigure highway and local connections to improve the efficiency of the transportation network. Collectively, these changes could result in a decrease in regional GHG emissions. Compared to the No-Build Alternative, the Modified LPA is expected to reduce GHG emissions by affecting travel choices and traffic operations in the following ways:

[1] Figure data notes: The values for this graphic are provided by the EPA U.S. Environmentally Extended Economic Input-Output Model. This model considers emissions for a wide variety of sectors in the U.S. economy, as categorized by the North American Industry Classification System (NAICS). The NAICS sector most closely aligned with DOT construction is 237310: Transportation Structures, Highways, and Streets. The model provides GHG emissions factors per U.S. dollar of purchase price (kg CO2e/$) and details about the largest sources of emissions for each industry.

- Encouraging mode shift to transit by providing an extension of TriMet's MAX light-rail between Portland and Vancouver and three new stations, expanded express bus service, and park and rides.
- Using demand management methods such as variable-rate tolling of the highway to reduce travel demand, promote mode shifts, and reduce travel during peak commuting periods.
- Improving traffic operations with ramp metering, auxiliary lanes, and roadway shoulders, which reduce idling by reducing congestion and disruptions due to vehicle crashes and other incidents.
- Eliminating bridge lifts and the associated congestion and idling for fixed-span bridge options, or reducing the number of movable-span openings.
- Encouraging mode shift from cars to active transportation (walking and bicycling) with facility improvements that provide a safe, comfortable, and direct path for walking, biking, and rolling.

IBR Program Climate Framework

The IBR Program has drafted a Climate Framework (see Appendix A of the Climate Technical Report) with two main objectives to guide processes and desired outcomes for climate: (1) reduce climate impacts and (2) improve climate adaptation and resilience through deliberate actions. The framework is intended to be applied during design, construction, and long-term operation and maintenance, with a goal of accounting for environmental impacts throughout the infrastructure life cycle. Evaluation of the IBR Program's performance related to climate objectives will be conducted at different stages. Table 3.19-3 provides an overview of the objectives for each stage.

Table 3.19-3. Climate-Related Objectives by IBR Program Phase

IBR Program Objective	Program Phase: Design/Refinement	Program Phase: Program Development and NEPA	Program Phase: Construction	Program Phase: Opening Day and Long-Term Operation
Design for resilience and adaptation	Avoid design choices that would restrict resilience to future climate conditions.	Assess future climate conditions, evaluate adaptability of design, develop climate-resilient design, and establish mitigation commitments.	Evaluate on-site needs regarding flooding, stormwater, heat tolerance, etc.; plan for and manage worker safety.	N/A; design and construction would be complete.
Reduce operational emissions	Design to support mode shift and VMT reduction. Develop high-capacity transit, improve active transportation, and implement roadway pricing.	Evaluate reasonable alternatives and design options in the NEPA process. Establish best management practices to reduce impacts.	N/A	Consider adaptive management and partner support. Consider air quality or temperature monitoring.