# 3.12 Energy

Federal, state, and local policies 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) Final EIS and Record of Decision were completed in 2011, with design refinements addressed in subsequent NEPA re-evaluations in 2012 and 2013. Since then, the following changes and new information have affected the potential impacts to energy:

- 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 that estimates 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.
- Changes to design of the CRC project's LPA to develop a Modified LPA, including design options.

Table 3.12-1 compares the impacts and benefits of the CRC LPA as identified in the Final EIS (2011) 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 Columbia River Crossing LPA Effects and 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 270,179 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.<br>• Changes in underlying assumptions about energy consumption from transit agencies. Values used for the CRC LPA were system-wide whereas values used for the Modified LPA are based on attributable changes. |

| Technical Considerations | CRC LPA Effects as Identified in the 2011 Final EIS | Modified LPA Effects as Identified in this Section | Explanation of Differences |
|---|---|---|---|
| Total GHG emissions during operations | Approximately 24,500,746 metric tons/day (2030) | Approximately 18,500,747 metric tons/day (2045) | • Same as annual energy use |
| Vehicle Miles Traveled | Approximately 36.4 million (2030 9-hour regional VMT) | Approximately 58.6 million (2045 daily regional VMT) | • Microscale VMT for the CRC LPA was reported for a 9-hour period, whereas microscale VMT for the Modified LPA is reported for a daily (24-hour) period.<br>• 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 $MTC0_2e$ | Approximately 2,595,850 mmBTU and 355,741 $MTCO_2e$ | • 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.

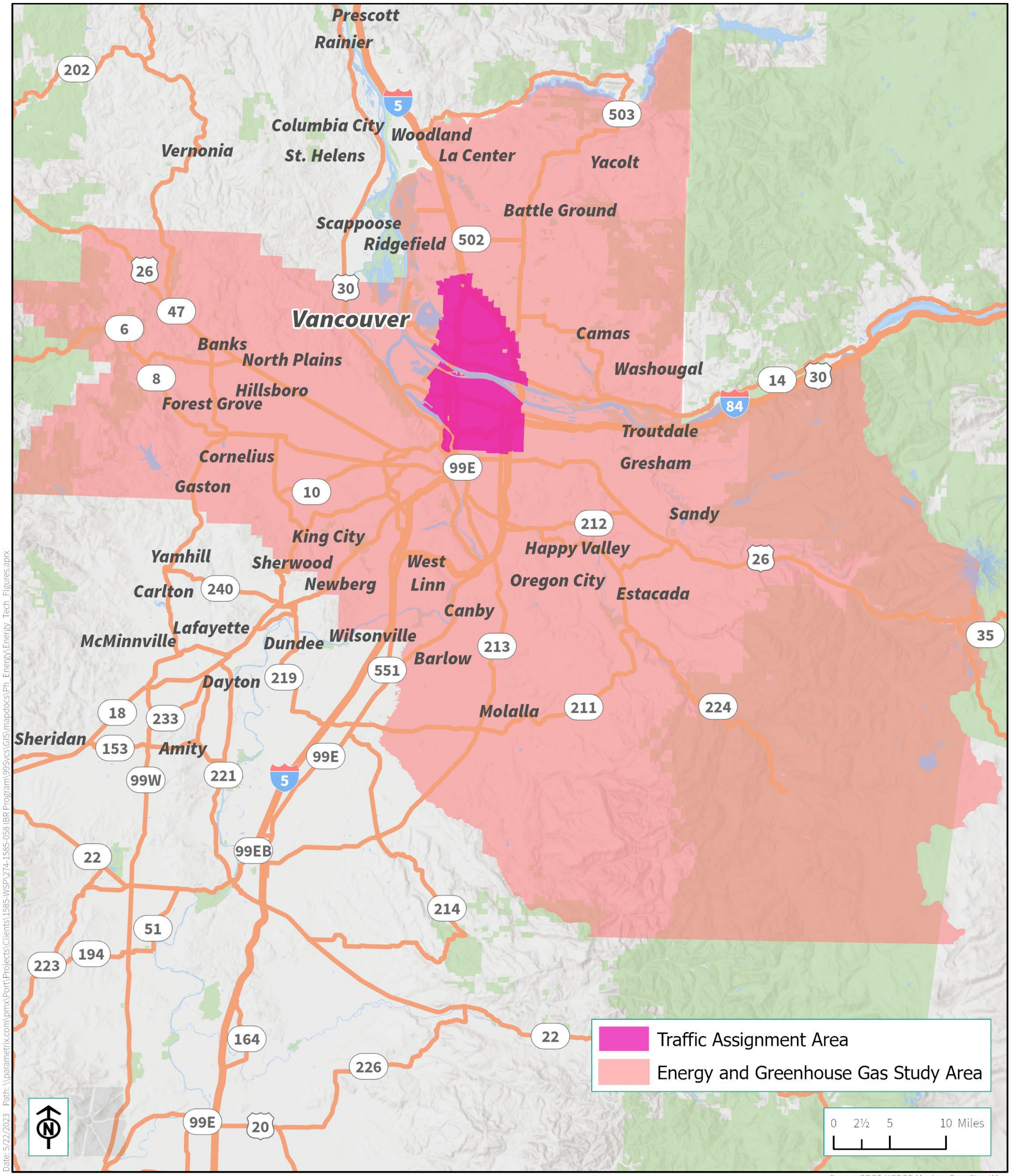
CRC = Columbia River Crossing; BTU = British thermal units; FHWA = Federal Highway Administration; GHG = greenhouse gas; IBR = Interstate Bridge Replacement; mmBTU = one million British thermal units; MOVES = MOtor Vehicle Emission Simulator; $MTCO_2e$ = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled

## 3.12.2 Existing Conditions

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

Existing conditions for regional and daily vehicle miles traveled (VMT) and regional and total energy consumption are presented in Table 3.12-2. To represent existing conditions energy consumption was estimated for the analysis year 2015, which corresponds to the base year of the regional travel demand model that serves as the basis for the regional emissions analysis. The EPA MOVES model, version 3.1.0, was used to estimate energy consumption from the roadway links in the study area. The energy consumptions for existing roadway and transit maintenance were not quantified. Energy consumption estimates for the existing transit operations in the study area are not currently feasible as energy input data is not complete. 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**



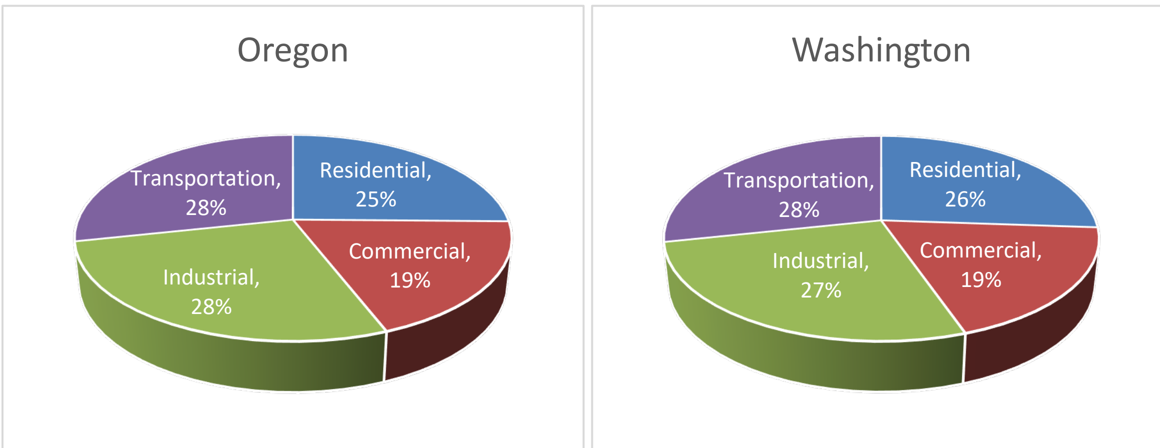

## National Energy Demand Projections

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 travel growth. As a result, energy consumption by light-duty and heavy-duty vehicles is projected to remain lower than 2019 levels through 2045.

### 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. 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 3.12-2). Carbon dioxide equivalent ($CO_2e$) was estimated as part of this analysis, and the results are presented in Section 3.19 Climate.

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 3.12-2), despite an increase in annual VMT in the study area over this same period.

**Table 3.12-2. 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] | 43,017,603 | 58,696,366 | 58,599,755 | -0.16% | 58,696,366 | 58,599,755 | -0.16% |
| Total Regional Transportation Energy Consumption (mmBtu/day) | 290,732 | 270,928 | 270,179 | -0.28% | 155,446 | 155,037 | -0.28% |
| Daily Traffic Assignment Area VMT | 11,267,296 | 14,278,275 | 14,199,184 | -0.55% | 14,278,275 | 14,199,184 | -0.55% |
| Total Traffic Assignment Area Energy Consumption (mmBtu/day) | 76,557 | 67,181 | 66,412 | -1.16% | 39,312 | 38,879 | -1.10% |

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 slightly more than 1%. This is the same for the Modified LPA with the double-deck fixed-span and single-level fixed-span bridge configurations. The single-level movable-span bridge 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 0.1%). 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 0.4% 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, which would result in 12 intersections not meeting acceptable operation criteria, compared to 10 intersections for the Modified LPA. This additional congestion and idling without the C Street ramps would decrease vehicle efficiency, which could result in increased energy consumption compared to the Modified LPA. Because this analysis is based on the regional travel demand model this potential increase in energy consumption is not quantified. The Modified LPA with the centered I-5 mainline or westward shift would have the same long-term energy consumption. All of the park and ride site options could equally encourage transit use, which would have been accounted for in the regional travel demand model and reflected in the energy consumption modeling results for the Modified LPA.

The differences in energy consumption between the scenarios with and without electric vehicles would be approximately 1.1% 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 3.12-3). The additional energy needs for new transit vehicles and new transit facilities are less than 6% of the energy consumption from on-road vehicles. 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 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), assuming a 30-year project life.

### *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 emergency use which would reduce congestion in general purpose lanes. Reducing the congestion caused by collisions would reduce energy consumption compared to the No-Build Alternative.

### *Bridge Lifts*

While there is no standard methodology to estimate how many drivers turn off their engines during a bridge lift, the Modified LPA with the double-deck fixed-span and the single-level fixed-span bridge configurations would be expected to reduce energy consumed by idling traffic during bridge lifts. The Modified LPA with the single-level fixed-span bridge configuration 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 bridge configuration would also reduce energy consumption with a lower profile grade; however, compared to the Modified LPA with the fixed-span bridge configurations, it may include additional energy consumption from the electricity required to raise and lower the bridge.

## 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

Using FHWA's Infrastructure Carbon Estimator (ICE) modeling tool, Table 3.12-4 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 3.12-4. Modified LPA Energy Consumption from Construction Activities**

| Project Element | Total Energy Consumption (mmBtu) |
|---|---|
| Materials | 2,241,745 |
| Transportation | 107,670 |
| Construction | 247,435 |
| Total | 2,595,850 |

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

## 3.12.5 Indirect Effects

The Modified LPA would indirectly affect the fuel cycle of producing and transporting purchased fuel and electricity. The energy analysis of the Modified LPA is based on travel demand modeling that includes expected growth and planned projects in the region. The analysis includes energy needed to charge electric vehicles and power electric transit vehicles. These increases in electricity demand would require local utilities to manage capacity and distribution accordingly.

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, 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*

There are no regulatory requirements to mitigate for energy consumption.

#### *Project-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, requiring measures to reduce vehicle and equipment idling, which would reduce energy usage.
- In Washington, comply with WSDOT's standard specifications to reduce energy use, 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.

#### *Project-Specific Mitigation*

Project-specific mitigation is not proposed to reduce energy consumption during construction.