Greenhouse Gas Impacts and Global Climate Change

The issue of greenhouse gas (GHG) emissions and global climate change is an important national and global concern that is being addressed by various state and federal agencies, including ODOT and FHWA. Appendix D of this FEIS includes a summary of current FHWA and ODOT climate change initiatives that are being pursued at the national and state levels.

The transportation sector is the second largest source of total greenhouse gas (GHG) in the U.S., and the largest source of CO_2 emissions—the predominant GHG. In 2004, the transportation sector was responsible for 31 percent of all U.S. CO_2 emissions. The principal human-made source of carbon emissions is the combustion of fossil fuels, which accounts for approximately 80 percent of anthropogenic emissions of carbon worldwide. Almost all (98 percent) of transportation-sector emissions result from the consumption of petroleum fuels.

Greenhouse gas emissions analyses may be informative at regional, state, or national levels when conducted during local and regional land use planning processes. ODOT's recent land use and transportation modeling efforts have shown that land use patterns have a much greater impact on all emissions than do highway expansions. Further, the needs for most highway projects are typically a result of land use changes, development, growth, and other local and regional trends.

As of the date of publication of this document, no federal laws specifically require GHG emissions analysis in project-level NEPA documents. NEPA requires federal agencies to scope and address the significant issues of any proposal and to concentrate on the analyses of issues that can be truly meaningful to the consideration of and comparison between project alternatives. In the absence of federal regulations and a regional or national framework for considering the implications of project-level GHG analyses, FHWA concludes that GHG emissions calculated for project alternatives cannot be usefully evaluated in the same way that vehicle emissions are evaluated within a local project-level context, and that such an attempted analysis would not inform project decision-making in any meaningful way.

Table 18 (next page) illustrates the relationship of current and projected Oregon highway CO_2 emissions to current global emissions. This table also illustrates the size of the project corridor relative to the total Oregon travel activity. In 2005, total statewide annual VMT (all roads) was 35.3 billion. According to the Oregon Transportation Plan, Transportation Needs for the years 2005-2030, Oregon's forecasted state highway VMT growth rate is 1.35 percent per year. If total VMT grows at the same rate, the value in 2030 will be 49.4 billion.

Because climate change is a global issue and the emissions changes due to project alternatives are minute, if measurable, compared to global totals, FHWA did not calculate the GHG emissions associated with individual alternatives or design options. The changes in GHGs would be similar to the changes in energy consumption (see Energy Section). Overall CO_2 emissions from the Oregon highway system are expected to grow only slightly between 2005 and 2035 because of the fuel economy and renewable fuels programs in the 2007 Energy Bill.

FHWA is also working with other modal administrations through the Department of Transportation Center for Climate Change and Environmental Forecasting to develop strategies to reduce transportation's contribution to greenhouse gases-particularly CO_2 emissions-and to assess the risks to transportation systems and services from climate changes.

Table 18. Greenhouse Gas Emissions (All Alternatives)

Global CO_2 Emissions 2005, MMT*	Oregon Highway CO_2 Emissions 2005, MMT	Projected 2030 Oregon Highway CO_2 Emissions, MMT	Oregon Highway Emissions, Percent of Global Total (2005)	Project Corridor VMT, Percent of Statewide VMT** (2005)
28,051	19.1	20.0	0.07%	0.00052%***

*EIA, International Energy Outlook 2008 (MMT – million metric tons). **Statewide VMT in 2005 was 35.3 billion.
*** The Clackamas Highway was used to create this estimate. In 2005, VMT on the Clackamas Highway was 184,680.

Oregon Strategies

Greenhouse gas emissions are currently not regulated in the State of Oregon. However, there are numerous goals for states and the nation to meet, and strategies to reduce GHG emissions are currently being addressed by ODOT and other state agencies throughout Oregon. On August 7, 2007, the Climate Change Integration Act came into effect with the passage of Oregon House Bill 3543. Oregon House Bill 3543 creates GHG emissions reduction goals for the State of Oregon which aim to reduce emissions 10 percent below 1990 levels by 2020 and achieve a 75 percent reduction below the 1990 levels by 2050. Oregon House Bill 3543 also created the Oregon Global Warming Commission that is responsible for recommending policies to state and local governments to reduce GHG emissions. The Commission is expected to promulgate rules to direct agencies on how to regulate and enforce the legislation.

Intelligent transportation systems (ITS) and land use planning policies will be among several strategies necessary to meet the state's goal of reducing GHG emissions. To accomplish this, the Commission has formed a Land Use and Transportation Committee (Committee). The scope and function of the Committee is to work with state agencies, including ODOT and the Oregon Department of Land and Conservation and Development (DLCD), to integrate GHG reduction goals into state transportation planning and land use policies currently under development. Transportation and land use policies will be designated to stop the growth of GHG emissions, and then reduce over time according to the specific goals set out by the Oregon Legislature.

Research is also underway to develop more capable models for measuring, analyzing, evaluating, and reporting GHG emissions. ODOT is coordinating with other state and federal agencies (DOE, ODEQ, FHWA, EPA) to determine appropriate contexts for measuring impacts from transportation and land use changes.

Additional ODOT specific strategies regarding climate change efforts are summarized in Appendix D.

ODOT's Recommended Alternative

Because greenhouse gas emissions are measured on a global scale and because the differences in design options are minute, if measurable, this resource area does not weigh into the selection of a recommended alternative.

Mitigation Measures for the Preferred Alternative

No short- or long-term mitigation is required or proposed.

Energy

This section evaluates the amount of energy that would be required to construct and use each alternative in 2030.

The Sunrise Project will be constructed in a region projected to gain one million residents by 2030. Decisions regarding new urban development and roadways are made within the framework of local and regional land use planning. Many other road and infrastructure projects in addition to the Sunrise Project are planned in the Portland metropolitan region. This project is expected to meet the needs of the existing development pattern of those areas that are already planned for development. Since the build alternatives are not expected to induce additional population or employment growth to the Portland metropolitan region as a whole, the build alternatives would result in a general transfer of demand and not an increase in travel demand throughout the region. The Sunrise Project, when considered in context of the entire Portland metropolitan region, would have a marginal impact on total fuel consumption, as shown below.

Project Area Impacts

The Sunrise Project would result in direct impacts due to fuel consumption by drivers on the highway, and in indirect impacts from using energy to construct the highway. The energy calculations are useful for comparing overall energy impacts among alternatives, but, because variables such as average fuel efficiency are used, the results are not precise enough to be considered definitive. Energy use is calculated using the number of average daily vehicles, the average distance those vehicles travel, and fuel consumption rates. Fuel consumption rates vary by type of vehicle, and energy use varies by type of fuel.

Operational energy analysis is based on vehicle miles traveled. Operational energy was calculated at the subregional area, the same area used for the transportation and air quality analyses, and at the corridor level. In 2005, VMT was 713,400 miles within the subregional area bounded by SE Sunnyside Road on the north, SE Jennifer Street and SE Eckert Lane on the south, I-205 and SE Webster Road to the west, and SE 172nd Avenue on the east. By 2030, VMT is expected to increase by 2.5 times within the same area if the proposed Sunrise Project is not built. In 2030, **Alternative 1–No Build** would result in the use of about 10.51 million gallons of fuel annually to drive 1.86 million miles.

The Energy Technical Report provides details on the following:

- Methodology for calculating impacts.
- Construction energy use by alternative.
- Operational energy use by alternative.
- Detailed mitigation descriptions.
- Energy calculation sheets.

Project **Alternatives 2** and **3** will increase VMT by 22 percent over **Alternative 1**, but will reduce the duration of congestion in the study area. This is because the project provides more capacity for the vehicles to drive during the peak periods. In the corridor, **Alternative 2** would result in between 13.07 and 15.80 million gallons of fuel consumed annually. **Alternative 3** would result in 14.31 to 14.38 million gallons consumed annually. The range of energy use depends on the design option chosen, as shown in Table 19. Most design options do not change the energy consumption by any noticeable amount, with the exception of **Alternative 2** with **Design Option B-2** (which has higher consumption due to increased circulation opportunities). The main reason for the similarity among design options is because the volumes and length of roadway do not differ sufficiently between **Alternatives 2** and **3** to cause a corresponding change in fuel consumption.

Preferred Alternative

The **Preferred Alternative** will increase VMT in the region by approximately 23 percent compared to **Alternative 1–No Build.** In the corridor, it will require approximately 14.6 million of gallons of fuel to operate on an annual basis, 28 percent more than

Alternative 1. The **Preferred Alternative** has slightly higher corridor operational energy use than any of the combined build alternatives and design options, with the exception of **Alternative 2 with Design Option B-2**.

Table 19. Energy Use for Construction and Operation by Alternative (million gallons of gasoline)

	Alt. 1	Alt. 2	Alt. 2 with A-2	Alt. 2 with B-2	Alt. 2 with C-2	Alt. 2 with C-3	Alt. 2 with D-2	Alt. 2 with D-3	Pref. Alt.
Construction[1]	n/a	59.10	58.40	65.40	59.20	60.00	61.10	61.60	54.70
Operation[2]	10.51	13.07	13.87	15.80	13.87	13.94	13.87	13.87	14.56
	Alt. 1	**Alt. 3**	**Alt. 3 with A-2**	**N/A**	**Alt. 3 with C-2**	**Alt. 3 with C-3**	**Alt. 3 with D-2**	**Alt. 3 with D-3**	**N/A**
Construction[1]	n/a	56.30	55.60		56.50	57.20	58.40	58.80	
Operation[2]	10.51	14.31	14.31		14.31	14.38	14.31	14.31	

[1]The total energy equivalent of millions of gallons of fuel to construct. [2]The total energy equivalent of millions of gallons of fuel for all vehicles using the Sunrise Project and the existing OR 212/224, annually, in 2030. **Alternative 1** totals are for the existing configuration of OR 212/224 with 2030 volumes.

Indirect Effects

Alternative 1–No Build was not evaluated with respect to comparing indirect impacts from construction, because it would have extremely minor impacts from the one project that it is associated with, in contrast to the major effort needed to build the proposed Sunrise Project.

Construction energy for **Alternatives 2** and **3** and the design options would require the equivalent of 55.6 to 65.4 million gallons of fuel. **Alternative 3** would use less energy to construct than **Alternative 2** (2.8 million fewer gallons of fuel). **Design Option A-2** is the only option that would require less energy to construct than **Alternatives 2** and **3**. All of the other design options would increase the energy needed compared to **Alternatives 2** and **3** without the design options. **Design Option B-2** would have the greatest impact, using 13 percent more energy than other options. This results from **Design Option B-2** having a longer roadway. **Design Option C-2** would require less energy to construct than **Design Option C-3**, by about 0.3 million gallons. **Design Option D-2** would require less energy to construct than **Design Option D-3**, by about 0.4 million gallons.

Of the major construction activities associated with the Sunrise Project, roadway construction would require the most energy (approximately 65 percent), followed by construction of associated structures (approximately 28 percent).

Preferred Alternative

The **Preferred Alternative** will use approximately 54.7 millions of gallons of fuel to construct, or between 2 and 16 percent less energy to construct than **Alternatives 2** and **3**. The majority (67 percent) of construction energy would be used for roadway construction, with the balance for structures (25 percent), and other project elements (8 percent).

Mitigation Measures for the Preferred Alternative

No energy mitigation measures are required or proposed for this project.