

Chapter 6 Cumulative Effects

Chapter 6 describes the cumulative effects that could result from this project, including effects to transportation, Environmental Justice, air quality, and climate change.

What are cumulative effects?

NEPA and its implementing regulations require federal agencies to identify and analyze the direct, indirect, and cumulative effects of a proposed federal action to make an informed decision. Analyzing cumulative effects helps to understand the “big picture” effects of a project and the possible effects that can be made on the regional environment. A federal agency’s responsibility to address these effects in the NEPA process was established by the Council of Environmental Quality (CEQ) regulations. The CEQ regulations define a cumulative effect as:

“...the impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (40 §CFR 1508.7).

As defined above, “actions” include construction of other transportation or development projects, such as a highway interchange, a light rail route, a housing subdivision, or an office park.

Cumulative effects are the summation of effects on a resource resulting from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes those actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

How were cumulative effects identified?

Our cumulative effects analysis only considers those resources that could be substantially affected by the project in combination with other past, present, and reasonably foreseeable future actions. Direct and indirect effects of the project are discussed in Chapter 5.

Based on our direct and indirect effects analysis, we determined that the SR 520 Variable Tolling Project may contribute to cumulative effects on the following elements of the environment:

- ▶ Transportation
- ▶ Environmental Justice
- ▶ Air quality
- ▶ Climate change

What sources were used to collect data for this section?

We used comprehensive plans, local city websites, PSRC research publications, and the *Puget Sound Regional Council Land Use and Travel Demand Forecasting Model* (January 2007) to analyze cumulative effects for the project area. In addition, we used the Cumulative Effects Discipline Report from the *SR 520 Bridge Replacement and HOV Project Draft EIS* (May, 2005) as a source of information for this section.

Why don't we study cumulative effects for all resources?

CEQ guidance only requires us to study cumulative effects on resources we affect either directly or indirectly. If there are no direct or indirect effects, there cannot be any cumulative effects

What are the geographic and temporal boundaries for this cumulative effects analysis?

The geographic resource boundaries we used for our cumulative effects analysis are based on the resources of concern and the potential effects to these resources.

For cumulative effects associated with traffic and transportation we used a geographic resource boundary comprising the area between I-5 and I-405 (SR 520, I-90, and SR 522), including I-5 and I-405. Because SR 520 is an integral link in a complex system of interconnected highways, changes to any one of these corridors could cumulatively affect the other corridors. At a more local scale we also considered reasonably foreseeable plans for development or redevelopment within approximately 1/4 mile of the proposed project area on SR 520.

These same cumulative transportation effects could also affect low-income populations in the same general area. Therefore, our boundary for the cumulative effects analysis associated with this element uses the same geographic resource boundary described above for transportation and traffic.

For air quality, we considered a wider area for cumulative effects because it must be looked at on a regional scale. Our geographic boundary for cumulative effects to air quality is King County.

Climate change is a global issue. Our analysis qualitatively addresses the potential effect of the project on climate change in the context of statewide efforts to address the issue.

The temporal boundaries for the analysis of cumulative effects should allow for the recognition of long-term trends as well as consider the effects of any future actions. The beginning boundary typically is based upon the availability of data or a meaningful event that has

influenced existing conditions (construction of a highway or railroad, for example).

We set the beginning of the temporal boundary for our cumulative effects analysis of this project with the opening of the first bridge across Lake Washington in 1940. This event drastically altered transportation and development patterns within King County.

Our cumulative effects analysis time frame extends in the future to 2016. We chose that year because it is when the SR 520 Bridge Replacement and HOV Project is expected to be completed. At that time, the existing Evergreen Point Bridge will no longer be in use. The new bridge built by the SR 520 Bridge Replacement and HOV Project, which is currently undergoing a separate environmental review, will likely have a different roadway configuration and different toll pricing. Therefore, the conditions we've analyzed in this document will no longer exist once the new bridge is completed in 2016.

What is the history of the area?

Historically, residential and commercial uses in the region were concentrated in Seattle. Until the Lake Washington Floating Bridge (later known as the Lacey V. Murrow Floating Bridge) was completed in 1940, the primary way people crossed Lake Washington was by ferry boat. However, the new bridge drastically reduced the time necessary to cross the lake and the Eastside became an attractive residential choice for those working in Seattle.

After World War II, residential and commercial land uses expanded east across Lake Washington as a result of a new national trend of suburbanization; Medina, Hunts Point, Clyde Hill, Yarrow Point and Bellevue incorporated in the 1950s. Between 1960 and 1963, construction of the Evergreen Point Bridge (SR 520) additionally contributed to rapid growth east of Lake Washington.



Interstate 90: the Homer M. Hadley bridge (left) and the Lacey V. Murrow (right) floating bridges, looking east toward Mercer Island.

In the last quarter of the twentieth century, the spread of urbanization resulted in greater population and employment on the Eastside of Lake Washington than in Seattle. With the increase in jobs on the Eastside, traffic across Lake Washington grew heavily in both directions. In 1989, the Homer M. Hadley Floating Bridge was built to provide more capacity across the lake on I-90; however, this additional bridge was not enough to offset the growth in traffic. Today, both corridors across Lake Washington are frequently congested.

What does the future hold for the area?

According to PSRC forecasts, the population in the Puget Sound region is expected to increase from approximately 3.5 million in 2006 to nearly 4 million people in 2016. Growth will be focused in urban growth areas, thereby increasing the density of development (PSRC's *Destination 2030*). Exhibit 6-1 shows existing and future employment and population characteristics for the four-county Puget Sound region.

**Exhibit 6-1
Existing and Future Population and Employment
Characteristics for the Puget Sound Region**

	2006	2010	2016
Total Population	3,507,603	3,695,504	3,967,418
Total Households	1,386,593	1,470,054	1,612,194
Low Income Households	346,199	367,511	403,062
Upper-Income Households	347,085	367,510	403,048
Retail Employees	337,567	351,883	380,855
Government Employees	228,345	244,182	254,512
Employees in Education	90,302	93,613	98,768
Employees in Manufacturing	201,765	219,391	216,115
College Students	152,295	171,759	175,543

Source: PSRC Population and Employment Data model

Among the four counties (King, Kitsap, Pierce, and Snohomish) in the Puget Sound region, King County is expected to see the most change in both population and employment numbers (*Destination 2030*).

What projects were considered for this cumulative effects analysis?

We considered, for this analysis, effects from any other projects located within or close to our project's study area. The projects also must be reasonably foreseeable. This typically means that the project is likely to happen or probable, rather than merely possible.

Development

Seattle has not issued any permits for new non-transportation related development within the project area along SR 520. Medina, Hunts Point, Clyde Hill, and Yarrow Point do not anticipate any future (non-transportation related) development other than the construction of new single-family homes on the few remaining vacant lots in the communities and the demolition of single-family homes to be replaced by larger homes. According to a Planning Information Specialist in the Kirkland Planning and Community Development Department (E-mail on October 9, 2008), a developer is proposing to construct an additional office building at the Plaza at Yarrow Bay located at 10220 Lake Washington Boulevard (north of SR 520).

Transportation

There are a number of transportation projects planned in or near the project area:

- ▶ SR 520 Bridge Replacement and HOV Project
- ▶ SR 520 Eastside Transit and HOV Project
- ▶ I-90 Two-Way Transit and HOV Operations Project

- ▶ I-405 NE 195th to SR 527 Northbound Widening Project
- ▶ I-405 NE 8th Street to SR 520 Improvement Project
- ▶ I-405 South Bellevue Widening
- ▶ Sound Transit University Link Light Rail Project
- ▶ Sound Transit East Link Light Rail Project
- ▶ Other Transit Improvements
- ▶ Other Lake Washington Urban Partnership Projects

Descriptions of these transportation projects are provided below.

Highway Projects

SR 520 Bridge Replacement and HOV Project

This project will improve the SR 520 corridor from I-5 in Seattle to the vicinity of Evergreen Point Road. It would include replacement of all the existing bridges with newer, safer bridges designed to better withstand earthquakes and windstorms. WSDOT plans to be open the project to traffic in 2016. Both the new roadway configuration and the toll rates would be different from what is being studied for the SR 520 Variable Tolling Project.

SR 520 Eastside Transit and HOV Project

This project will complete the HOV lanes from Lake Washington to SR 202. HOV lanes and transit stops will be shifted from the outside to the inside of the roadway. Extensive improvements will be constructed along the approximately three-mile section of SR 520 between Lake Washington and 108th Avenue NE. These improvements include a new eastbound HOV lane and HOV lane direct access ramps to and from the west at 108th Avenue NE. Construction on this project is expected to begin in 2010 and be completed in 2013.

I-90 Two-Way Transit and HOV Operations Project

This project, a partnership between WSDOT and Sound Transit, will add HOV lanes to the I-90 outer roadway between Seattle and Bellevue. The project also includes new I-90 HOV on- and off-ramps on Mercer Island, and will improve I-90 HOV access at Bellevue Way. Stage 1 of the project, which includes new westbound HOV direct access ramps at Bellevue Way SE and 80th Avenue SE, opened for service on October 10, 2008. Stage 2 of the project involves improving eastbound I-90 from Mercer Island to Bellevue, and is scheduled to be constructed from 2010 to 2012. Stage 3 will provide improvements to eastbound and westbound I-90 between Seattle and 80th Avenue SE on Mercer Island and will be constructed from 2011 to 2014.

I-405 NE 195th to SR 527 Northbound Widening Project

The NE 195th to SR 527 Northbound Widening Project will add a new lane on northbound I-405 between NE 195th Street and SR 527. Construction is scheduled to start in 2009 and be complete by Winter 2010.

I-405 NE 8th Street to SR 520 Improvement Project

The I-405 – NE 8th Street to SR 520 Improvement Project will build new structures to separate northbound traffic exiting to SR 520 from traffic entering I-405 at NE 8th Street in Bellevue. In addition, a new eastbound lane along SR 520 will be built to separate the on and off-ramps between I-405 and 124th Avenue traffic. A new on-ramp at NE 10th Street to SR 520 will also be built. Construction is scheduled to begin in 2009, and the affected area will be open to traffic in 2012.

I-405 South Bellevue Widening

The I-405 – South Bellevue Widening Project, also known as the 112th Avenue SE to SE 8th Street Project, will help to relieve congestion for travelers coming in and out of Bellevue. Between 112th Avenue SE and I-90, a new northbound lane will be added, and the existing

northbound bridge over Coal Creek Parkway will be widened. Between I-90 and SE 8th Street, one new lane in each direction (from I-90 to SE 8th Street) will be added; the Wilburton Tunnel will be removed; a new three-lane, southbound bridge over I-90 will be built; and the existing southbound bridge over I-90 will be converted to carry northbound HOV traffic. Construction on this project began in spring 2007, and is scheduled to be finished in fall 2009.

Light Rail Projects

Sound Transit University Link Light Rail Project

University Link is a 3.15-mile light rail extension that will run from downtown Seattle to the University of Washington, with stations at Capitol Hill and on the University campus near Husky Stadium. Sound Transit is currently finishing final design work, and construction is scheduled to begin in early 2009. Sound Transit plans to open University Link for service in 2016.

Sound Transit East Link Light Rail Project

East Link is an approximately 18-mile long light rail extension that will run along I-90 from downtown Seattle to the Eastside. It will have 11 to 14 stations serving Seattle, Mercer Island, south Bellevue, downtown Bellevue, Bel-Red/Overlake, and Redmond. Although Sound Transit has not identified a final alignment yet, all alignments being considered will convert the center roadway of I-90 across Lake Washington to light rail operation. Sound Transit expects to start construction in 2013, with operations starting as early as 2020.

Other Transit Improvements

Lake Washington Urban Partnership

The transit elements of the Lake Washington Urban Partnership are focused on reducing congestion along SR 520 by providing alternatives to driving and paying a toll. King County Metro is the lead agency for the transit

elements of the Lake Washington Urban Partnership. King County Metro will purchase twenty 60-foot and twenty-five 40-foot hybrid motor coaches, and improve bus stops through real-time information signs about bus arrivals (at seven stops) and improved passenger shelters and lighting (at two stops). King County Metro will also expand park-and-ride facilities that serve the SR 520 corridor. They plan to replace a 613-space surface parking lot with an 853-space parking garage and by build a new 386-space parking garage.

King County Metro—Transit Now

King County Metro is currently implementing their Transit Now service expansion that was approved by voters in 2006. One element of Transit Now is RapidRide – a new streamlined bus service that will provide frequent, all-day service in several corridors. One of the five RapidRide corridors funded by Transit Now is the Eastside RapidRide line. It will operate between the new downtown Redmond Transit Center and the Bellevue Transit Center via the Crossroads and Overlake neighborhoods. Riders will be able to connect to high-frequency bus service across Lake Washington at the Overlake Transit Center and Bellevue Transit Center.

Sound Transit 2

Sound Transit will be increasing express bus service in the region in 2009 as a result of the Sound Transit 2 ballot measure approved by voters in 2008. The Sound Transit service expansion will increase the frequency of service on many routes, including three that cross Lake Washington. These routes are the 545 between Redmond and Seattle, 550 between Bellevue and Seattle, and the 554 between Issaquah and Seattle.

Other Lake Washington Urban Partnership Projects

Telecommuting Project

The telecommuting element of the Lake Washington Urban Partnership involves expanding telecommuting opportunities and transportation demand management beyond what it is today. PSRC is the lead agency for the telecommuting element of the Lake Washington Urban Partnership. Their efforts will include increasing outreach to employers about alternative transportation options and incentives to use them, and providing improved traveler information and trip planning services to employees. Widespread broadband Internet access and support from major employers will enable the expansion of telecommuting programs so more people can have the option to telecommute or use flextime. This will help reduce work trips during weekday peak commute times in the mornings and evenings.

UPA Active Traffic Management Project

This project will use Active Traffic Management techniques to help reduce congestion along SR 520. Specific techniques allow for the detection of incidents, facilitate the removal of disabled vehicles, and provide travelers with real-time information about traffic conditions, such as through 511 and electronically changeable roadway signage. WSDOT will install variable speed limit signs to facilitate smoother traffic flow during peak travel periods. Variable speed limits, improved on- and off-ramp access and real-time traveler information signs, will provide commuters with the tools and information they need for a more reliable trip.

What cumulative effects would result from the SR 520 Variable Tolling Project?

The following sections describe the potential cumulative effects of the SR 520 Variable Tolling Project compared to the No Build Alternative.

Transportation

Most of the projects described above will be under construction during the period 2010 and 2016 when the SR 520 Variable Tolling Project is operating. Both SR 520 and I-90 are likely to have construction projects between I-5 and I-405 throughout this period. WSDOT also plans to have some projects under construction on I-405 through 2012. We do not expect the SR 520 Variable Tolling project to have any noticeable cumulative effect on travel patterns in combination with the construction of these projects. Existing capacity constraints on the highway system and planned construction on both of the direct routes across Lake Washington will limit diversion related to construction. Overall, we expect construction of other projects to have a negligible incremental cumulative effect with the diversion related to the SR 520 Variable Tolling Project.

As the highway and transit improvements we identified are completed, we expect they will cumulatively improve regional mobility in addition to the congestion reduction from the SR 520 Variable Tolling Project. Transit users crossing Lake Washington will especially see cumulative benefits. The SR 520 Eastside HOV and Transit Project and the I-90 Two-way Transit and HOV Project will provide noticeable improvements in transit service reliability across Lake Washington on both corridors. Coupled with the transit improvements being implemented by King County Metro and Sound Transit, many transit users crossing Lake Washington will experience a noticeable cumulative improvement in

transit service between now and 2016. Transit use across Lake Washington will also likely see a cumulative increase as service improves and people look for ways to avoid the toll implemented by the SR 520 Variable Tolling Project.

Environmental Justice

Construction planned for the un-tolled routes around or across Lake Washington may make it more time-consuming for low-income SR 520 users to take an alternate route to avoid paying the toll. A potential positive cumulative effect is the transit service improvements described above will make it easier for some low-income users to use transit to avoid the toll on SR 520.

Air Quality

A reduction in congestion and a decrease in the volume of vehicles will likely reduce the amount of emissions emitted from autos. However, even with increases in traffic volumes, emissions are likely to be lower than present levels due to EPA's programs to reduce emissions by 2020. Overall, little affect is expected for air quality.

Climate Change

What are greenhouse gases and climate change?

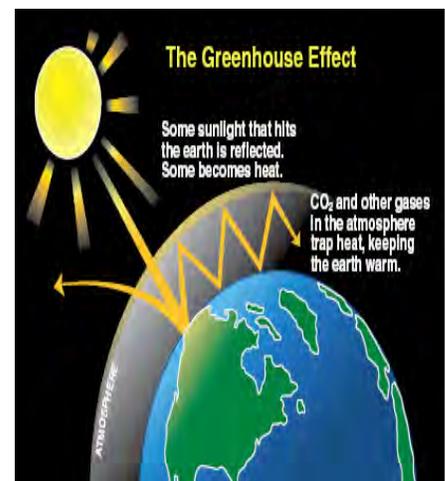
Vehicles emit a variety of gases during their operation; some of these are greenhouse gases (GHGs). The GHGs associated with transportation are water vapor, carbon dioxide (CO₂), methane (also known as "marsh gas"), and nitrous oxide (used in dentists' offices as "laughing gas"). CO₂ makes up the bulk of the emissions from transportation. Any process that burns fossil fuel releases carbon dioxide into the air.

Vehicles are a major source of GHG emissions and contribute to global warming primarily through the burning of gasoline and diesel fuels. National estimates

Will I-90 be tolled also?

The Washington State Legislature is currently considering a proposal to toll I-90 across Lake Washington. No decisions had been made at the time we did our analysis, so we did not consider a toll on I-90 reasonably foreseeable.

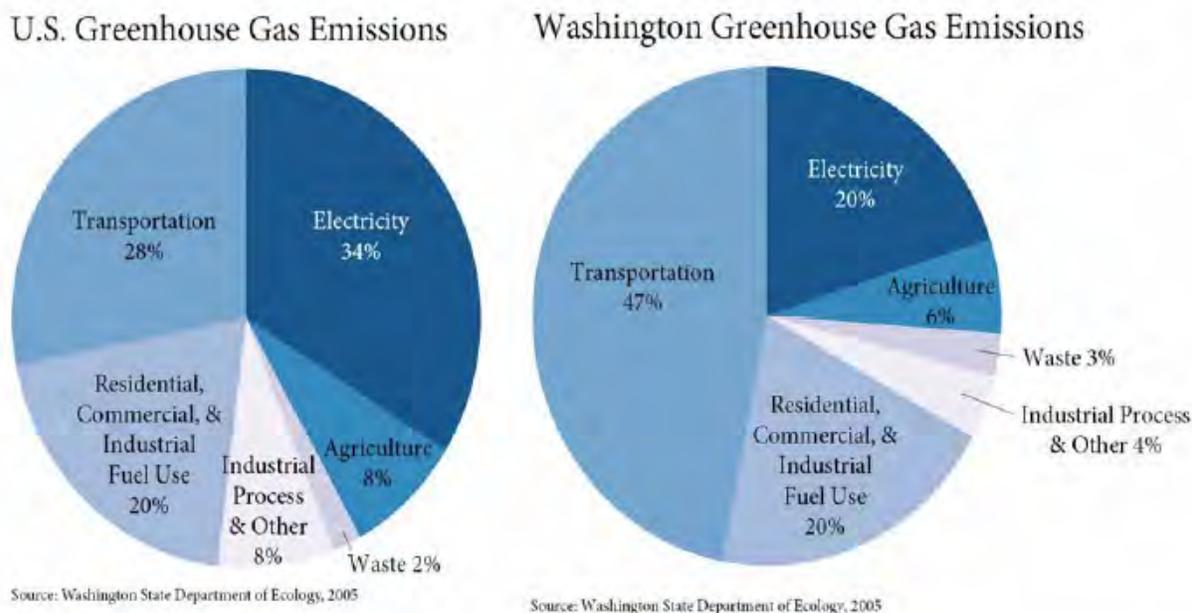
If I-90 were to be tolled, it will limit the un-tolled alternate routes available for crossing Lake Washington. A separate environmental review would be required for tolling I-90.



Greenhouse Gas Effect

show that the transportation sector (including on-road, construction, airplanes, and boats) accounts for almost 30 percent of total domestic CO₂ emissions. However, in Washington State, transportation accounts for nearly half of GHG emissions because the state relies heavily on hydropower for electricity generation, unlike other states that rely on fossil fuels such as coal, petroleum, and natural gas to generate electricity. The next largest contributors to total gross GHG in Washington State are fossil fuel combustion in the residential, commercial, and industrial sectors at 20 percent; and in electricity consumption, also 20 percent. Exhibit 6-2 shows the gross GHG emissions by sector, nationally and Washington State.

Exhibit 6-2
GHG Emissions by Sector, 2005, U.S. and Washington State



What efforts are underway to reduce greenhouse gas emissions in Washington State?

In February 2007, Governor Gregoire issued Executive Order 07-02 requiring state agencies to find ways to reduce GHG emissions and adapt to the future that

climate change may create. On May 3, 2007, the Washington legislature passed Senate Bill 6001 that, among other things, adopted the Governor's climate change goals into state law. This law sets greenhouse gas reduction goals, sometimes referred to as benchmarks, for Washington State:

- ▶ 1990 greenhouse gas levels by 2020.
- ▶ 25 percent reduction below 1990 levels by 2035.
- ▶ 50 percent by 2050.

In 2007 the Climate Advisory Team was formed to carry out the Governor's executive order. The final report included recommendations of actions to reduce Washington's emissions.

The Washington legislature passed and the Governor signed HB 2815 in the Spring of 2008. This bill includes, among other elements, statewide per capita VMT reduction goals as part of the state's GHG emission reduction strategy.

In 2008, a group similar to 2007's Climate Advisory Team was established as the Climate Action Team. This group worked to refine 2007's broad recommendations into specific actions the state can take to reduce emissions. Among other items, the group focused on strategies to reduce VMT and include climate change in SEPA evaluations. More information on this statewide process is available at http://www.ecy.wa.gov/climatechange/2008CAT_overview.htm.

In addition to working in partnership with the Climate Action Team, WSDOT is working to reduce GHG emissions through other activities. WSDOT is a state leader in developing effective, measurable, and balanced emission reduction strategies. Current WSDOT activities that reduce GHG emissions include, but are not limited to:

Vehicle Miles Traveled (VMT)

VMT stands for vehicle miles traveled and is the number of miles vehicles travel each year. For transportation projects with set boundaries, VMT can refer to the aggregate number of miles that all the vehicles travel using the specified roadways.

Transportation Options: For 30 years, WSDOT has supported carpooling, vanpooling, and public transportation through the funding, building, and maintenance of the freeway HOV system, ferries, rail, and other programs. These investments help to reduce the number of vehicles on the roadway during peak congestion and help reduce total VMT.

In addition to working to reduce emissions on the transportation network, WSDOT is taking action to reduce the agency's emissions. Steps include:

No-Idle Policy: In 2006, WSDOT adopted a no-idle policy to reduce fuel use and vehicle emissions. It is estimated that by reducing vehicle idling by 50 percent, WSDOT can save as much as \$500,000 annually in fuel costs.

Reducing Diesel Emissions: In 2005, WSDOT started using 5 percent biodiesel (B5) mixed with regular diesel in maintenance vehicles operating in the Central Puget Sound area. Currently, 25 WSDOT fueling stations have 10 percent biodiesel (B10) available and there is a goal toward using 20 percent biodiesel (B20), depending on availability.

In addition to the recent state activities focusing on climate change, WSDOT and its partners are actively implementing the 2005 Transportation Partnership Act, a 16-year plan to meet Washington State's most critical transportation needs. Many of the local, regional, and statewide transportation system improvements in conjunction with ongoing programs will help reduce the VMT each year. Together these efforts combine to create more efficient driving conditions, offer mode choices, and help move toward state GHG goals.

How do we determine the effect transportation improvements have on greenhouse gas emissions?

Quantitative modeling tools to evaluate GHG emissions for linear transportation projects are limited at this time.

Did you know?

An average car emits one pound of carbon dioxide for every mile it is driven. So for every mile you avoid driving, you reduce the carbon dioxide added to the atmosphere by one pound.

At the project level, WSDOT is currently unable to show the effect of improved traffic flow on emissions.

WSDOT and regional transportation planning organizations are working on methods and models to improve the quality of information and guidance for evaluating GHG emissions from transportation. Tools under development will allow for GHG calculations that account for changes in VMT and other factors, depending on project size and type in the future. Guidelines for applicable projects and how to discuss GHG emissions in a more meaningful way are also under development.

How will the SR 520 Variable Tolling Project help to reduce GHG emissions and climate change?

Since about half of the State of Washington's GHG emissions are from transportation (automobiles and trucks), reducing single-occupant vehicle trips is a good place to start. HOV lanes have been shown to encourage people to carpool, vanpool, or take the bus rather than drive by themselves. Every two-person carpool reduces the amount of GHG emissions created by that trip by about half of what it would be if both people drove. Vanpools would reduce GHGs by much more. The SR 520 Variable Tolling Project will encourage more people to use the bus and carpool, thus assisting in reducing GHG emissions and climate change. Also, since the project will improve traffic flow and increase average peak hour speeds, we anticipate that it will reduce overall energy consumption. Reducing energy use should decrease GHG emissions.

What measures will be taken to minimize cumulative effects?

No mitigation measures, beyond those already described for direct and indirect effects in Chapter 5, will be taken to minimize cumulative effects.

