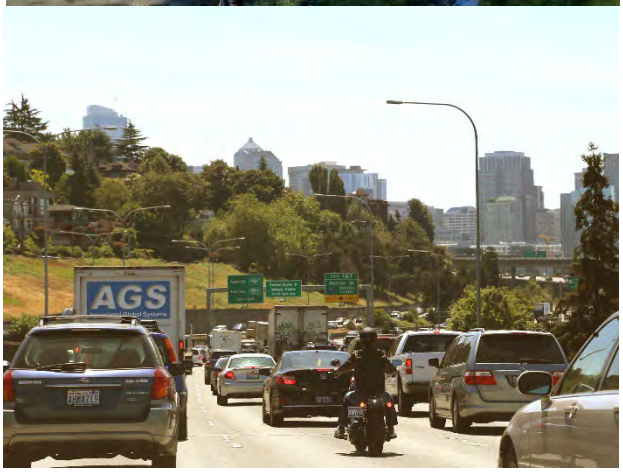
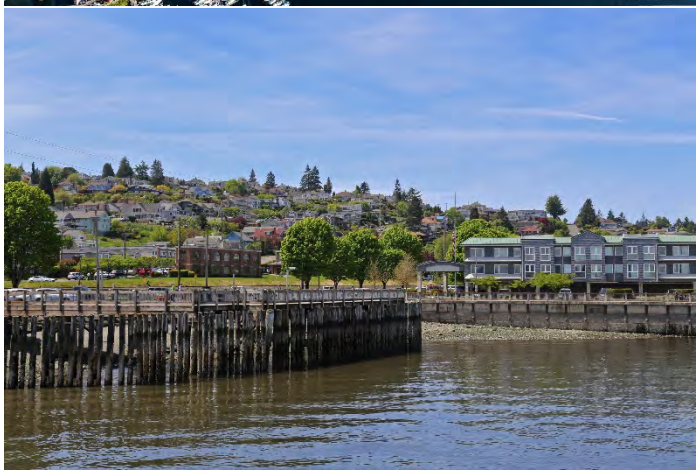
VISION 2050







Climate Change

Background Paper

February 2019

Puget Sound Regional Council

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Introduction and Purpose

Climate change is an urgent environmental, economic, and equity threat being addressed at many levels, from local to international. Climate change encompasses both rising temperatures and extreme weather events and is caused by an increase in greenhouse gases trapping heat in the atmosphere. In the Puget Sound region, the largest sources of greenhouse gases come from transportation and the built environment, including residential, commercial and industrial activities. Although efforts to mitigate climate change continue to be made across all sectors, they have failed to keep pace. More work is needed to fully address our local contributions to climate change and to prepare our communities for potential impacts.

The purpose of this background paper is to summarize information on regional climate change issues within the context of PSRC's planning efforts. It provides an overview of state and regional actions, sources of greenhouse gases, impacts from climate change, and current and potential regional strategies to address mitigation and resilience. In addition, regional goals, multicounty planning policies and actions are proposed to be updated as part of VISION 2050.

Background and Policy Context

The following section summarizes the regulatory setting in the state of Washington related to climate change, as well as regional and local initiatives.

Washington State

The state of Washington has long recognized the threat climate change poses to economic well-being, public health, natural resources, and the environment. In 2008 the Washington State Legislature set limits on Washington's greenhouse gas emissions in state law. [i]

The law requires the state to limit emissions to achieve the following reductions:

- By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels.
- By 2035, reduce overall emissions of greenhouse gases in the state to 25% below 1990 levels.

- By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to 50% below 1990 levels, or 70% below the state's expected emissions that year.

The law further calls for the design of a regional multi-sector, market-based system in coordination with the Western Climate Initiative, to limit and reduce emissions of greenhouse gases.

The state has enacted numerous strategies and actions to provide a statewide framework for meeting these limits, including the Clean Air Rule, adopted in 2016, which is a "cap and reduce" mechanism for reducing carbon emissions from the state's largest emitters. The Clean Air Rule was suspended in 2018, pending further court review. Other initiatives and rules have addressed emissions from state agencies, renewable energy targets, clean vehicles, green buildings, and impacts from climate change.

Puget Sound Clean Air Agency

In February 2017, the Puget Sound Clean Air Agency (PSCAA) adopted the following economy-wide greenhouse gas emission reduction targets for the four-county central Puget Sound region:

- By 2030, reduce overall greenhouse gas emissions in the region to 50% below 1990 levels.
- By 2050, reduce overall greenhouse gas emissions in the region to 80% below 1990 levels.

These targets are based on the most recent science regarding the level of emission reductions necessary to stabilize the climate. Since transportation is the largest single source of greenhouse gas emissions in the region, the agency identified candidate actions and strategies to reduce transportation-related emissions and support achievement of the targets. These include supporting the policies and strategies included in PSRC's Regional Transportation Plan and VISION 2040. Further, PSCAA candidate actions include accelerating zero emission vehicle adoption and pursuing a clean fuel standard, among other strategies. [ii]

Local Agencies

Many cities, counties and other organizations in the region have also adopted greenhouse gas emission reduction targets, which vary in breadth and timeframes. For example, King County adopted targets to reduce greenhouse gas emissions 25% by 2020, 50% by 2030 and 80% by 2050, from a 2007 baseline. The City of Tacoma has a goal of reducing emissions 40% from 1990 levels by 2020. Snohomish County has goals to reduce emissions from county operations 20% from 2000 levels by 2020. Many other jurisdictions are also addressing climate change and the reduction of greenhouse gas emissions.

Consistent with VISION 2040, almost all cities and counties have adopted comprehensive plans that contain provisions that directly or indirectly support climate mitigation, including plans for compact, transit-oriented development, and protection of environmentally critical areas. Many also contain provisions that support climate adaptation and resilience. Further, many cities and counties in the region have also developed climate action plans.

Coordinated efforts in the region are also enhancing local climate action. The King County-Cities Climate Collaboration is working to coordinate and enhance the effectiveness of local government climate and sustainability action in King County.[iii] Through the Collaboration, county and city staff are partnering on outreach, strategy coordination, sharing of solutions and data, and funding and resources.

In 2016 the City of Seattle was selected by the Rockefeller Foundation to become a part of the 100 Resilient Cities program, which helps cities prepare for the impacts of climate change and other issues.

The Puget Sound Climate Preparedness Collaborative is a network of local and tribal governments, regional agencies, and organizations in the central Puget Sound region working together to ensure that the economy, environment, and all residents are resilient to the impacts of climate change.[iv] The Collaborative creates a forum for peer learning and exchange of information, ideas, and opportunities related to climate preparedness.

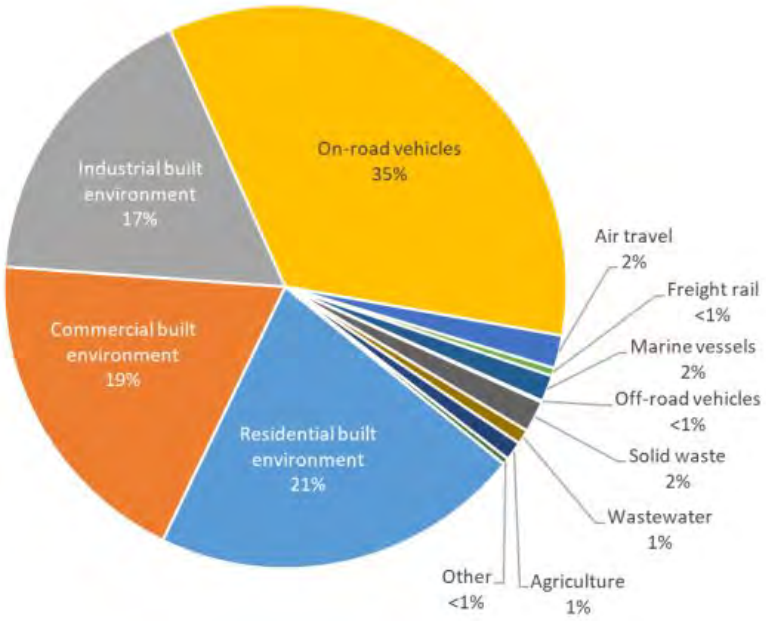
This is by no means an exhaustive list of the activities happening at the state, regional and local level on climate change and resilience. The following sections describe the sources of greenhouse gas emissions in the region, the expected impacts from climate change, PSRC's planning efforts, and future work.

Regional Sources of Greenhouse Gas Emissions

In 2015, the Puget Sound Clean Air Agency, with support from PSRC, conducted a comprehensive greenhouse gas inventory for the central Puget Sound region.[v] The last time a regional inventory was conducted was in 2005, but since protocols and methodologies have changed since then, a direct comparison between the two years is not possible.

The largest source of greenhouse gas emissions in the region in 2015 was the built environment (commercial, residential, and industrial sectors) at 57% (Figure 1). The second largest source was transportation (on-road vehicles, air travel, freight rail, marine vessels, and off-road vehicles) at 38%. Emissions from solid waste (2%), wastewater (1%), and agriculture (1%), were minimal.

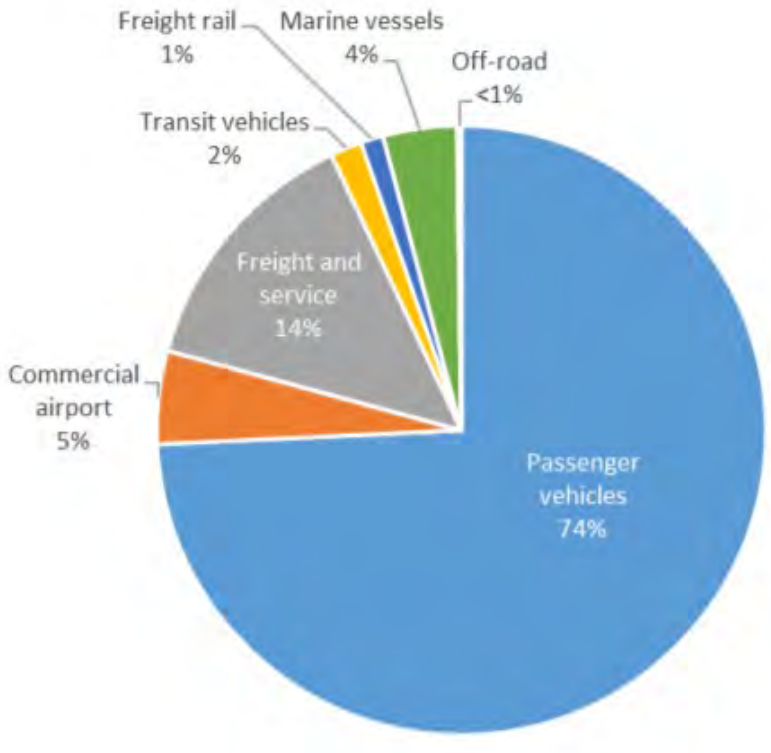
Figure 1: Sources of regional greenhouse gas emissions



Source: Puget Sound Clean Air Agency Greenhouse Gas Emissions Inventory

Within the residential and commercial built environment, electricity consumption represented the largest share of emissions, followed by natural gas consumption and petroleum-based fuels. Petroleum-based fuels within the residential built environment category are used for heating and items such as lawn, garden and recreational equipment. Industrial emissions are primarily sourced from stationary combustion of natural gas and distillate oil from large industrial operations, followed by fugitive gas emissions from refrigerants. Within the transportation sector, passenger vehicles represent the largest share (74%), followed by freight and service vehicles (14%) (Figure 2).

Figure 2: Sources of regional transportation greenhouse gas emissions



Source: Puget Sound Clean Air Agency Greenhouse Gas Emissions Inventory

Climate Change Impacts in the Central Puget Sound Region

The University of Washington's Climate Impacts Group published *State of Knowledge: Climate Change in Puget Sound* in 2015,[vi] describing expected impacts from climate change in the Puget Sound region. Changes are expected to include temperature, precipitation, sea level, and ocean acidification. These changes will affect snowpack

and streamflow, landslides, flooding, species and habitat, forests and agriculture. A few examples of impacts the region can expect to experience include:

- Decreased snowpack and increased winter stream flows
- Increased landslides, erosion and sediment transport during fall, winter and spring
- Increased extent and frequency of flooding and storm surge
- Negative effects on salmon from warmer streams, ocean acidification, lower summer streamflow, and higher winter streamflow
- Changes in forest tree species and increased large wildfires
- Changes to agriculture including increased pests, heat stress, flood risk, and growing season and decreased summer water availability
- Changes in coastal habitats, including increased salt marshes and erosion and decreased freshwater marshes
- More frequent and severe harmful algal blooms
- Negative effects to some species such as salmon and shellfish due to changes in marine ecosystems

The impacts listed above will, in turn, have many effects on people and communities. Hazards such as floods, wildfires, and heat waves will have impacts on the built environment, including transportation, energy, drinking water, stormwater, and wastewater systems. An increase in heat waves and flooding, poor air and water quality, and increased allergens and spread of diseases will harm human health. Communities of color, indigenous people, and people with lower incomes are at higher risk due to greater exposure to hazards and often have fewer resources to respond to those hazards. [vii] Tribes are particularly vulnerable due to impacts on the forest, coastal and marine ecosystems on which they rely.

The report identifies actions to reduce risk, including assessing vulnerabilities, building partnerships, climate-informed planning, and implementing adaptation. Some of these actions are being undertaken by jurisdictions and organizations in the region, as described earlier in this paper.

PSRC Climate Change Planning

As the Metropolitan Planning Organization and Regional Transportation Planning Organization for the region, PSRC provides planning and policy guidance that can help

the region achieve meaningful reductions of greenhouse gas emissions from transportation and land use, as well as supporting efforts to prepare for the impacts from climate change.

VISION 2040 is the region's current long-range growth management, environmental, economic development, and transportation strategy. VISION 2040 is a shared strategy for moving the central Puget Sound toward a sustainable future. It recognizes that growth and development have impacts on the environment, including the climate. As the region continues to grow and change, VISION 2040 works towards a center-oriented pattern of growth that supports vibrant, livable and heathy communities, while protecting the environment and offering economic opportunities for all. VISION 2040's regional growth strategy, multicounty planning policies, and actions promote compact growth patterns, low-carbon travel choices, forest protection, and other sustainability strategies that will help to mitigate climate change. Multicounty planning policies play a key role in creating a common framework for planning at various levels throughout the region. PSRC is currently in the process of updating VISION to plan for growth to 2050.

The Regional Transportation Plan (PSRC, 2018) is the long-range functional transportation plan designed to implement VISION, providing the path for a sustainable, multimodal transportation system to accommodate the needs of a growing population. In addition, the plan established a Four-Part Greenhouse Gas Strategy, [viii] consisting of:

- **Land Use:** implementing VISION 2040 and the Regional Growth Strategy, furthering the goal of balancing jobs and housing, focusing growth in centers and providing for efficient communities
- **User Fees:** transitioning the region over time to a user fee/roadway pricing system
- **Choices:** continuing to provide travelers options to the single-occupant vehicle
- **Technology:** supporting development of technology to dramatically reduce tailpipe emissions

The Regional Transportation Plan includes programs and investments that encompass all four of these categories, and in the last decade many actions have been taken at the

federal, state and regional level to advance implementation of the strategy, which is designed to support and complement statewide efforts to achieve statutory limits.

Appendix E of the Regional Transportation Plan provides more detailed information on advancements within each of the four categories of the Four-Part Greenhouse Gas Strategy, including a summary of elements contained within the current version of the plan. Provided below are some highlights of implementation efforts within each category, followed by a discussion on potential additional steps the region could take to further reduce greenhouse gas emissions.

Land Use

Since 2010, many land use actions, programs and planning activities have been advanced; a few examples include:

- Updates to Countywide Planning Policies to implement VISION 2040, including individual city and county growth targets
- Updates to local plans as part of the 2015-16 comprehensive plan update process
- An updated Regional Centers Framework in 2018
- Continued work on transit-oriented development, including the ongoing work of the Regional TOD Advisory Committee

The current baseline assumption for growth around transit stations in the region by 2040 is approximately 30%. As part of the work to update VISION to 2050, an alternative is being developed that would further concentrate that growth to 75% around transit stations by 2050. Additional gains may be made within the land use category through changes to development patterns that would encourage proximity of new residential and commercial construction to services and amenities that would lessen the need for driving.

In addition, while outside the scope of PSRC's work program, additional gains can be made through building energy efficiency. Washington state has been a leader in green buildings and energy efficiency, with state requirements on new building energy efficiency as well as requirements for high performance public buildings. However, as mentioned above, residential and commercial buildings represent a significant portion

of the region's greenhouse gas emissions, and the retrofit of existing buildings presents many challenges.

User Fees

User fee systems are in place on several facilities in the region, including high occupancy toll, or express toll, lanes on State Route 167 and Interstate 405, and full tolls on State Route 520 and the Tacoma Narrows Bridge. Additional facilities are expected to include tolls or express toll lanes, including State Route 99 through downtown Seattle, and managed lanes are being evaluated on Interstate 5 and other facilities. The Regional Transportation Plan's financial strategy assumes a transition from traditional pricing mechanisms to a user fee system, including selected facility tolls and a road usage charge system, after 2025. These user fee pricing systems have the potential to both generate revenue as well as manage travel demand.

Research, such as that conducted as part of the work of the Transportation Futures Task Force (2015-2016), suggests that increasing the price lever could result in a change in travel behavior and demand, moving more trips away from single occupant vehicles. Modest changes in the current plan assumptions, should they be considered by decision makers, have the potential to generate additional greenhouse gas emission reductions. More information will be learned from the road usage charge pilot study being conducted by the Washington State Transportation Commission, with results expected to be reported to the Legislature in 2020.

Transportation Choices

Significant investments have been made over the last decade to provide multimodal transportation improvements, including new trails, bus rapid transit and light rail services, high occupancy vehicle lanes, etc. With the passage of funding mechanisms such as Connecting Washington, Sound Transit 3, Kitsap Transit Fast Ferries and other local initiatives, many of the investments in the Regional Transportation Plan are funded or under construction.

In addition, the region's transit agencies have adopted long-range transit plans which plan for and support implementation of an integrated regional transit network. With these coordinated investments, significant improvements in providing frequent transit

service will be made throughout the region. Improvements are still needed, however, to ensure residents have safe and convenient access to these frequent transit networks, particularly through nonmotorized and high occupancy modes.

Technology

Significant federal actions have been taken over the last decade to improve the fuel economy of vehicles and reduce emissions from fuels. These include updated fuel economy standards and improvements to the fuel efficiency of heavy-duty vehicles. Significant strides have also been made in advancing the transition to electric vehicles, particularly along the West Coast. Ongoing coordination efforts are occurring among a variety of agencies and stakeholders throughout the region to further accelerate this transition.

These technological improvements to vehicles and fuels have the potential to significantly reduce greenhouse gas emissions in the region. However, a variety of strategies will be required to help achieve this outcome, particularly related to electric vehicles. These include mechanisms to support charging infrastructure in buildings and in public rights of way, expanding education and incentives on electric vehicles, encouraging electric vehicles in private and public fleets, and other local, regional and state actions.

Resilience

PSRC has also been working in coordination with state, regional and local partners on resilience and preparing the region for impacts from climate change and natural hazards such as earthquakes. "Resilience" is defined for these purposes as preparing for impacts, mitigating future impacts, and the ability to recover to a "pre-event" state. PSRC is a founding member of the Puget Sound Climate Preparedness Collaborative and continues to monitor the state of the practice and engage in a variety of forums to advance this work.

PSRC also recently completed the Regional Open Space Conservation Plan, identifying priority actions for preserving open space throughout the region. These areas can play an important role in sequestering carbon, protecting from the impacts of climate change, and increasing resilience.

Next Steps

PSRC will continue to coordinate and collaborate with state, regional and local partners to advance the implementation of the Four-Part Greenhouse Gas Strategy and Regional Open Space Conservation Plan, as well as resilience activities throughout the region.

There is potential for additional emission reductions within each of the four categories of the Four-Part Greenhouse Gas Strategy, as identified above. As the work to update VISION to 2050 continues, there will be opportunities to further engage with local jurisdictions on the role they can play in implementation of the strategy and other local options to mitigate climate change, particularly as they begin updating their comprehensive plans over the next few years.

PSRC also plans to work with partner agencies to develop a regional scale inventory of risks and hazards, to provide assistance to member agencies as they incorporate resilience into their comprehensive planning processes.

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[i] Chapter 70.235 RCW

[ii] PSCAA Candidate Actions to Reduce Transportation Greenhouse Gas Emissions. http://www.pscleanair.org/DocumentCenter/View/3314/Evaluation-Report_Transportation-Actions_June2018?bidId=

[iii] King County. King County-Cities Climate Collaboration. https://www.kingcounty.gov/services/environment/climate/strategies/k4c.aspx.

[iv] Puget Sound Climate Preparedness Collaborative. https://pugetsoundclimate.org/.

[v] PSCAA Greenhouse Gas Emissions Inventory. http://www.pscleanair.org/DocumentCenter/View/3328/PSCAA-GHG-Emissions-Inventory?bidId=

[vi] Climate Impacts Group. State of Knowledge: Climate Change in Puget Sound. http://cses.washington.edu/picea/mauger/ps-sok/ps-sok_cover_and_execsumm_2015.pdf.

[vii] UW. An Unfair Share: Exploring the Disproportionate Risks from Climate Change Facing Washington State Communities. http://frontandcentered.org/wp-content/uploads/2018/08/AnUnfairShare_WashingtonState_August2018.pdf.

[viii] Regional Transportation Plan, Climate Change Analysis, Appendix E. https://www.psrc.org/sites/default/files/rtp-appendixe-climatechangeanalysis.pdf.