

# The Regional Transportation Plan — 2018

## Appendix R Documentation of Analysis Tools



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Additional copies of this document may be obtained by contacting: Puget Sound Regional Council  
Information Center  
1011 Western Avenue, Suite 500  
Seattle, Washington 98104-1035  
206-464-7532 • [info@psrc.org](mailto:info@psrc.org) • [psrc.org](http://psrc.org)

## **APPENDIX R: Documentation of Analysis Tools**

This appendix was prepared to provide updated information about PSRC's analysis results and tools. To make use of the best available information, PSRC staff, working with other technical staff from member agencies, has developed several enhancements to PSRC's suite of models and analysis tools. The discussion below provides a summary of the analysis results and the changes to the tools.

### **Regional Macroeconomic Forecast**

#### **Purpose**

The 2015 Regional Macroeconomic Forecast of population and jobs for the year 2040 was used for the Regional Transportation Plan's land use assumptions. The 2015 Forecast provides long-range regional growth assumptions for key demographic and economic variables (e.g. population, households, and employment) out to the year 2040. The regional forecast values serve as control totals for developing sub-county long-range land use assumptions, which in turn serve as key inputs to the regional travel demand model and analysis. It also provides future estimates of transportation related tax bases upon which transportation taxes get levied which are used to support the estimation of transportation revenue projections.

#### **Model/Tool**

The 2015 Forecast was developed using the Puget Sound Regional Macroeconomic Forecasting (PSRMF) model developed by the firm ECONorthwest. It utilizes two exogenous elements: an extension of results from the well-regarded national macroeconomic model developed and maintained by Yale professor Ray Fair, and an Aerospace employment forecast based on global demand projections and labor productivity trends. The regional model itself is structured in a top-down manner, with productivity, aggregate employment, income and inflation forecast initially, and subsequent modules for demographic composition and industry detail. The entire model has been updated to incorporate economic effects of the demographic transition underway nationally and its workforce implications.

The PSRMF produces integrated tax base forecasts—i.e., consistent with the regional economic and demographic forecast. These are combined with existing transportation tax rates to calculate projections of future transportation revenue.

#### **Key Assumptions**

Key assumptions from the latest 2015 Regional Macroeconomic Forecast include:

- Adjustments for the demographic shift offset a more optimistic national forecast, so employment and population for 2040 is essentially unchanged from our previous forecasts. Per capita personal income growth is forecast at a nearly identical rate, on average 3.1 percent annually.
- The 2015 forecast predicts a total of 2.1 million households in 2040, with a slightly smaller household size than was projected in 2012.
- Forecast inflation is lower than the 2012 forecast by 1.2 percentage points annually, on average.

#### **Updated Forecasts out to 2050**

In January 2018, PSRC staff released a draft forecast of population, households and jobs out to the year 2050 for use in upcoming work on the VISION 2050 Update. These forecasts suggest

that another 1.8 million people and 1.2 million jobs could be expected in the region by the year 2050. The forecasts also suggest that the population forecast in the year 2040 could be even higher than currently being planned for in this update of the Regional Transportation Plan while the total employment in the year 2040 is expected to be similar. Work force participation rates and the aging of the region's population are key drivers of the higher population forecasts in the draft 2050 forecast.

Federal regulations require that regional transportation plans be based on a region's adopted land use assumptions. In the central Puget Sound region, these are the land use assumptions developed for the region's growth management, environmental, economic, and transportation strategy – VISION 2040, adopted in 2008. Forecasts and guidance for growth planning in that document are the basis for population and employment targets that have been adopted by the region's counties and used for local comprehensive plans.

PSRC has recently launched a project to update VISION 2040 and extend its planning horizon out to the year 2050, with an expected adoption in 2020. After VISION 2050 is complete, the region's counties and municipalities will update their growth targets and comprehensive plans. PSRC will use these updated land use assumptions, based on the new PSRC 2050 population and jobs forecast, when it next updates the Regional Transportation Plan in 2022.

## **Land Use Forecast – Land Use Vision (LUV) Dataset**

### **Purpose**

The land use forecast provides the long-range land use and growth assumptions that are utilized as key inputs to the regional travel demand model and analysis. It starts with the Regional Macroeconomic Forecast of population, household, and job growth through the year 2040, and allocates the projected growth across the region to individual parcels.

### **Model/Tool**

For the 2018 Regional Transportation Plan technical analysis, PSRC used an application of the UrbanSim land use model system to develop a land use allocation product called Land Use Vision (LUV). The LUV dataset was crafted to meet the technical specifications and policy requirements outlined below in the Key Assumptions section.

LUV projects growth in the PSRC region through 2040 and was developed through the following process. First, the PSRC Regional Macroeconomic Forecast supplies regional totals for population, households, and jobs. Second, the Macroeconomic Forecast is apportioned to annual city and county control totals using numeric policy guidance from the VISION 2040 Regional Growth Strategy and adopted local growth targets. Third, the control totals are used in UrbanSim to allocate projected growth on developable land at the parcel level. Fourth, the model results are shared with and vetted by local planners, and post-modeling adjustments are made to better reflect adopted local policy. Lastly, the LUV dataset is converted into the applicable formats for use as input in the regional activity-based travel demand model.

### **Key Assumptions**

The technical and policy assumptions underlying the LUV dataset were established to ensure federal air quality conformity analysis requirements regarding use of "latest available planning assumptions" were met. The key assumptions are as follows:

- The LUV dataset is consistent with the region's most current long-range regional forecast of households, population and employment from the 2015 Regional Macroeconomic Forecast
- The LUV dataset reflects the regional long-range strategic growth assumptions as detailed by VISION 2040 Regional Growth Strategy
- The LUV dataset is reflective of locally adopted growth targets and comprehensive plans developed to begin implementing the VISION 2040 Regional Growth Strategy

## **Travel Demand Analysis / Geodatabase**

### **Purpose**

PSRC has developed a customized set of computer programs and mathematical procedures to simulate current and future travel patterns and conditions within the four counties (King, Kitsap, Pierce, and Snohomish) of the central Puget Sound region. These programs and procedures are collectively referred to as the “regional travel demand forecasting model” or simply as the “travel model.” The travel model produces detailed spatial and network data that are used to analyze how the region’s transportation infrastructure and environment are likely to be impacted by future population growth and development. The travel model provides the analytical foundation from which PSRC develops many of its plans including the 2018 Regional Transportation Plan.

### **Model/Tool**

A new travel demand model called SoundCast produced model results for the plan. SoundCast is an activity-based model, which represents people’s need to travel to conduct daily activities, as compared to the previous model which aggregately represented trips between zones. As an activity-based model, SoundCast allows for greater temporal and spatial resolution to better evaluate alternative transportation policies. The performance outcomes shown throughout the plan rely on the fine-grained results from SoundCast. To learn more, visit:

<https://www.psrc.org/activity-based-travel-model-soundcast>

### **Key Assumptions**

Land use and population allocations (representing demand conditions) along with transportation projects, policies, and network attributes (representing supply conditions) represent the key input assumptions for any travel demand analysis framework. For the travel demand analysis used to support the plan analysis, the previously mentioned LUV dataset, allocated throughout the region across 3,700 transportation analysis zones comprises the key land use assumption, while the set of transportation projects and policies enumerated within the plan form the basis for the key transportation network assumptions and any subsequent scenarios developed for analysis.

## **Air Quality / Climate Change Analysis**

### **Purpose**

The air quality analysis estimates future regional motor vehicle emissions of criteria pollutants and greenhouse gases. The analysis combines mobile source emissions factors from the latest EPA model and output from the travel demand analysis, including link-specific VMT and vehicle speed. EPA’s emissions software has been updated and MPOs are required to use this updated tool. The results of the plan analysis are consistent with changes to emissions that EPA advised would occur using the new software, and the region continues to meet all federal and state air quality requirements.

### **Model/Tool**

PSRC utilized the most recent version of EPA’s Motor Vehicle Emission Simulator, MOVES2014a, to develop emissions factors used to conduct the air quality analysis of the plan. The MOVES2014a model represents EPA’s most up-to-date assessment of on-road mobile

source emissions, including incorporation of the most current vehicle, fuel and emissions standards and new and updated emissions data from a variety of test programs and other resources.

### **Key Assumptions**

The key assumptions underlying the air quality analysis are as follows:

- The fleet mix and age distribution from the base year are utilized
- The model accounts for the phase-in of current emissions standards, inspection/maintenance programs, fuel standards, and engine technology, and contains assumptions regarding the rate of vehicle changeout and fleet turnover for each forecast year

The model does not predict future regulations or technological advances, and PSRC does not make any additional assumptions about the future vehicle fleet as it is input to the model; the only place where alternate vehicle fleet assumptions are utilized is in the technology scenarios contained within the Four-Part Greenhouse Gas Strategy.