

## Vehicle Miles Traveled Definition Primer

Vehicle miles traveled (VMT) is an important metric in understanding how people driving use the transportation system. Federal, State, and local agencies use VMT to understand travel behavior, evaluate performance related to policy, and for planning and investment decisions. It is a key metric in transportation planning because it captures vehicle travel changes (system usage) over time and can be used to assess the impacts of land use and transportation policies and supports forecasting future travel. VMT is measured and reported in many different forms to support multiple tracking and forecasting purposes. This document summarizes the primary VMT definitions and how they are used in Oregon.

### DEFINITION

VMT is a measurement of the amount of travel by vehicles on roadways within a geographic area over a given period of time. VMT is an estimate derived from observed data, models, or a combination of both. VMT differs from PMT (person miles traveled) which accounts for all modes and includes vehicle occupancy.

### TYPES OF VMT: ROADWAY-BASED VMT VS HOUSEHOLD-BASED VMT

At the state level, roadway-based and household-based VMT estimates produce similar results for non-freight vehicle travel. However, at finer geographic scales the methods can vary substantially.

**Roadway-based VMT** measures total vehicle travel on **public road segments**, linked to infrastructure usage

**Purpose:** Quantify amount of driving in the area and what facilities are most used

- Used for infrastructure maintenance and capacity planning
- Used as denominator in safety measures (e.g. crash rates per million VMT)

**Reported in:**

- Traffic Counting webpage (annual)
- Congestion Overview report (biennial)
- State of the System Mobility webpage (annual)
- Highway Cost Allocation Study (biennial)
- Federal Highway Administration's (FHWA) Highway Performance Monitoring System (annual)

**Household-based VMT** counts miles **driven by residents**, linked to vehicles domiciled in a specific geography

**Purpose:** Quantify amount of miles residents of an area are driving

- Used for local long-range planning of non-driving options
- Specific to state transportation planning rule requirements (OAR 660) that apply to metropolitan area Transportation System Plans (TSPs) and greenhouse gas (GHG) reduction targets

**Reported in:**

- TSP modeling of the existing and proposed network (OAR 660-012-0160/0830)
- Land Use & Transportation Performance Measures (OAR 660-012-0905)
- GHG Reduction Targets for Metropolitan Areas (OAR 660-044-0020/0025)

## VMT DIMENSIONS

VMT reporting often captures additional dimensions beyond, making VMT reporting complex:

**Time Period:** VMT is typically reported as an annual number. Modeled VMT is typically reported for an average day or for a peak period.

**Roadway Type:** VMT is reported by road functional classes based on FHWA classification (e.g. interstates, arterials, local roads) or road ownership (federal, state, county, city).

**Travelers** VMT is reported for specific groups or trips (e.g. visitors, inbound-outbound-through, intercity-local).

**Vehicle Type:** Travel is tallied for all motorized vehicles, or for a specific vehicle type. Body type classifications used in federal VMT reporting (e.g. 13 FHWA Vehicle Classes<sup>1</sup>), while weight classes are frequently used in taxation and vehicle emissions regulations.

**Geographic Extent:** VMT is reported at the statewide level for high-level, at city or county level for TSPs, and at sub-regional level for project impact assessment.

**Other:** VMT is also reported by other dimensions, e.g. speed groups, rural and urban, per capita, trip purpose.

## DATA SOURCE:<sup>2</sup>

**Roadway counters:** Traffic counters and in-road detectors estimate the number and types of vehicles that use the roads within a specified geography over a specified time period. Classification counters can discern vehicle types. No information on the origins and destinations of trips and typically limited to larger roadways.

**Odometer reporting:** Owner-reported vehicle odometer readings such as from state vehicle emission inspections,<sup>3</sup> vehicle title transfers, and Oregon's Road Usage Charge Program (OReGO).<sup>4</sup> Include all miles traveled in the vehicle on all roadways, regardless of why, when and where it occurs. Only reported in aggregate for privacy reasons. Helpful to assess the VMT impact of local land use and transportation options and socio-economic groups.

**Household travel survey:** The 2010-11 and 2023-24 Oregon Household Travel Surveys recruited a diverse range of volunteers across the state to report on their travel activities over a multi-day period. This includes self-reported trip purpose, length, and travel mode. Sampled surveys are weighted to best represent the full population.

**Travel model:** Various computer programs models output daily VMT in a given area based on the travel behavior of different user groups—and their interaction with the transportation system and land use. Both roadway- and household-based VMT can be output. Some models can discern time period, vehicle type, travelers, and road ownership (although not all roads are represented) and geographies.

---

<sup>1</sup>[https://www.oregon.gov/odot/Data/documents/FHWA\\_Vehicle\\_Classes.pdf](https://www.oregon.gov/odot/Data/documents/FHWA_Vehicle_Classes.pdf)

<sup>2</sup>“Observed” sources (counts, odometer, surveys) are best to track VMT over time. “Modeled” sources enable what-if scenarios of demographic, land use and transport inputs.

<sup>3</sup> Covers roughly 22% of all Oregon DMV registered vehicles. Electric and newer cars are exempt.

<sup>4</sup> <https://www.oregon.gov/odot/programs/pages/orego.aspx>

## USE OF VMT IN OREGON

State policy sets directions for reducing car and light truck VMT and supporting more efficient travel patterns. The Oregon Transportation Plan identifies VMT reduction as a Key Performance Target for meeting mobility, climate, and land use goals. In addition, the Transportation Planning Rule (OAR 660-012) requires local jurisdictions to monitor and reduce household-based VMT per capita. Using consistent VMT definitions ensures that statewide and local actions are measured and compared accurately.

## VMT DATA REPORTING

The different forms of reported VMT vary based on the dimensions selected for the calculation. While reported data can appear similar, use of different definitions, dimensions, and sources can result in seemingly conflicting estimates of reported VMT. Having multiple metrics allows analysts to better understand travel trends and plan accordingly to meet the state's goals.

### Traffic Counting Webpage<sup>5</sup> (Roadway-Based VMT)

The FHWA's Highway Performance Monitoring System (HPMS<sup>6</sup>) requires all State DOTs submit annual VMT estimates as a condition of receiving Federal funding. The data aggregated by vehicle and roadway functional classifications also include the following **roadway-based** VMT:

- Annual statewide VMT on Oregon public roads
- Annual statewide VMT on Oregon state-owned highways
- Annual VMT on Oregon state-owned highways within each county
- FHWA Highway Statistics<sup>7</sup>
- VMT by Federal Functional Classification and Rural/Urban (future incorporation)

### Congestion Overview Report<sup>8</sup> (Roadway-Based VMT)

The Congestion Overview Report uses the Oregon HPMS **roadway-based** VMT data and reports the following:

- Statewide VMT by highway jurisdictional ownership and vehicle classification
- Statewide VMT and per capita VMT over time
- Statewide truck VMT, statewide per capita truck VMT

### State of the System (Mobility) Webpage<sup>9</sup> (Roadway-Based VMT)

The State of the System webpage uses the Oregon HPMS **roadway-based** VMT data and reports the following with annual update:

- Statewide VMT
- Statewide VMT indexed to 1990

---

<sup>5</sup> <https://www.oregon.gov/odot/Data/Pages/Traffic-Counting.aspx>

<sup>6</sup> <https://www.fhwa.dot.gov/policyinformation/hpms.cfm>

<sup>7</sup> <https://www.fhwa.dot.gov/policyinformation/statistics.cfm>

<sup>8</sup> [https://www.oregon.gov/odot/Planning/Documents/2024\\_Statewide\\_Congestion\\_Overview.pdf](https://www.oregon.gov/odot/Planning/Documents/2024_Statewide_Congestion_Overview.pdf)

<sup>9</sup> <https://www.oregon.gov/odot/state-of-the-system/Pages/mobility.aspx>

- Statewide per capita VMT indexed to 1990
- Passenger VMT per capita (future incorporation)

#### Highway Cost Allocation Study VMT<sup>10</sup> (Roadway-Based VMT)

Oregon law (ORS 366.506) mandates a Highway Cost Allocation Study (HCAS) to identify VMT by vehicle weight to assess whether passenger and freight vehicles are paying their proportionate share to the Highway Fund. HCAS uses **roadway-based** estimates from a purpose built model incorporating data from multiple sources, including vehicle registrations and weight mile tax records.

- VMT by vehicle weight category (biennial update, 4-year forecast)

#### Oregon Statewide Transportation Strategy (Household-Based VMT)

The Oregon Statewide Transportation Strategy (STS), the state’s roadmap for meeting 1990-2050 greenhouse gas reduction goals (ORS 468A.205), uses **household-based** VMT for tracking state and associated metropolitan GHG Targets (OAR 660-044). Through the Oregon Transportation Emissions website,<sup>11</sup> metropolitan GHG requirements (OAR 660-044), and the 2024 Oregon Transportation Plan, household-based VMT per capita are reported in the following:

- Statewide, progress on 1990-2050 goal (STS Monitoring)
- Metropolitan area, progress on regional GHG Reduction Targets 2035-2050 (Scenario Planning)

#### Transportation Planning Rule (TPR) requirements<sup>12</sup> (Household-Based VMT)

The TPR (OAR 660-012) requires cities and counties in metropolitan areas, through their local transportation system plans, to demonstrate no increase in VMT per capita between base and horizon years. Local transportation system plans are exempt from this requirement if no capacity increasing projects are included in the financially-constrained project list. This reflects the authority of a local jurisdiction to enact actions that increase travel choices so that residents can travel shorter distances or by other modes, freeing up capacity for intercity and freight. The TPR (OAR 660-012) and metropolitan GHG target rules (OAR 660-044) use a **household-based** VMT per capita definition for consistency and to enable tracking progress. These two documents provide guidance for estimating the household-based VMT for local TSPs:

- “Calculating Vehicle Miles Traveled Overview and Procedures”,<sup>13</sup>
- “A Planner’s Guide to Calculating Household VMT per Capita”<sup>14, 15</sup>

---

<sup>10</sup> <https://www.oregon.gov/das/oea/pages/hcas.aspx>

<sup>11</sup> <https://www.oregontransportationemissions.com/progress>

<sup>12</sup> <https://www.oregon.gov/odot/Planning/Pages/Metropolitan-Transportation-Planning.aspx>

<sup>13</sup> [https://www.oregon.gov/odot/Planning/Documents/TM7\\_Calculating\\_VMT\\_Overview\\_and\\_Procedures.pdf](https://www.oregon.gov/odot/Planning/Documents/TM7_Calculating_VMT_Overview_and_Procedures.pdf)

<sup>14</sup> [https://www.oregon.gov/odot/Planning/Documents/Planners\\_Guide\\_to\\_Calculating\\_VMT\\_per\\_Capita.pdf](https://www.oregon.gov/odot/Planning/Documents/Planners_Guide_to_Calculating_VMT_per_Capita.pdf)

<sup>15</sup> Currently HH VMT is estimated with travel models, while current ODOT Research works to establish observed data: SPR 893 Development of Methods to Produce High-Quality ‘Household-Based’ VMT Dataset