TECHNICAL MEMORANDUM #4

DATE: February 8, 2024

TO: Zachary Horowitz, PE | ODOT

FROM: Garth Appanaitis, PE, Aaron Berger, PE, Kayla Fleskes-Lane, PE, Bob Schulte, Dock Rosenthal, PE | DKS Associates

Jeff Frkonja, Joel Freedman, Ali Etezady, and Ted Linn | RSG

SUBJECT: TPR Modeling and Analysis Guides Update

Tech Memo #4: Model and Document Review

Project #22129-005

The TPR Modeling and Analysis Guides Update (the "Project") will provide modeling and transportation analysis procedure guidance to address recent changes to the Oregon Administrative Rules (OAR) related to the Climate Friendly and Equitable Community (CFEC) program. To better understand the current capabilities of the models to address CFEC-related analysis changes, this memorandum documents a review of six Metropolitan Planning Organization (MPO) travel demand models. This review is not intended to provide a comprehensive review of all aspects of the travel demand models but instead focuses on elements related to CFEC requirements, specifically related to the following three modeling objectives:

1. Defining an analytical process for ***calculating household-based vehicle miles travelled (VMT) per capita***, including understanding the sensitivity to policy actions/investments that might reduce VMT per capita.
2. Improving and refining ***consistency for regional travel demand model future reference scenario assumptions*** affecting VMT calculations.
3. Developing ***procedures for implementing Climate-Friendly Areas (CFAs)*** into travel demand models.

This model and tool review is the second key step in the project workflow:

- Step 1 – Identify CFEC Analysis Requirements (completed)
- ***<u>Step 2 – Review Models to Identify Limitations and Opportunities (current step)</u>***
- Step 3 – Lay out Framework for Applying Models/tools (future step)
- Step 4 – Develop Draft Methods and Conduct Climate Friendly Area Case Studies (future step)
- Step 5 – Review Draft Methods with Committee and Revise as Needed (future step)
- Step 6 – Document Methods and Procedures (future step)

EXECUTIVE SUMMARY OF REVIEWED MATERIALS

Key findings described in this document include:

- The Strategic Tactical Operations Reporting and Monitoring (STORM) framework includes several tools. This project will focus on application of Regional Travel Demand models and SWIM and may incorporate other off-model tools and methods.
- SWIM has been used to estimate external trip distribution and provides an opportunity to estimate trip distance for external trips that leave the MPO model boundary.
- Travel demand models generally have limitations related to the sensitivities of several areas that have been previously identified:
  - GHG Policy (e.g., demand management and pricing)
  - Paradigm shifts (e.g., current models do not yet incorporate ongoing travel survey findings)
  - Mode shifts based on experience of modal travel options (e.g., comfort of pedestrian or bicycle travel)
- Off model tools or adjustments may be needed to account for limitations of travel models
  - Examples include micro modes or modal investments
- The JEMnR structure provides numerous model inputs, some of which are relevant and likely have higher sensitivity to impacting model results related to Climate Friendly Areas and other CFEC requirements. Some of these components that are potential levers to model the conditions and ultimate measure impacts include:
  - TAZ Socioeconomic data (land use and demographics)
  - Level of Service Date (Transit time, bike time, walk time)
  - Zonal input data (intersection density, transit coverage)
- Most regional MPO models in the state are trip-based models using JEMnR. Individual MPO models include variations of JEMnR and have unique elements or regional aspects that may be unique or more impactful to the modeled area (e.g., pricing, park and rides, university, vacation homes, etc.) relative to other MPO models.
- The Southern Oregon Activity Based Model (SOABM) is an existing implementation of ABM using the CT-RAMP structure. ODOT will be migrating from the CT-RAMP to the ActivitySim framework in the future and the model design process is currently underway.
- The ABM provides features that introduce opportunities not found in the trip-based models, including:
  - Better representation for non-motorized travel using all-street networks
  - Population synthesizer tools for future scenario modeling

CONTEXT OF REVIEWED MATERIALS

In addition to review of model documentation and interviews with modeling staff, this review builds upon previous reviews and model documentation efforts, including:

- *Oregon Greenhouse Gas Modeling and Analysis Tools*, Oregon Department of Transportation, December 6, 2018
- *Transportation Related Greenhouse Gas Modeling in Oregon: Recommendations for Improving Oregon's Transportation Related GHG Analysis Tools,* Oregon Modeling Statewide Collaborative Greenhouse Gas Subcommittee, Updated February 7, 2022

Other resources that may provide additional context were not reviewed in full but are noted here:

- FHWA GHG_Handbook
- TRNews341.pdf (trb.org)
- Statewide Transportation Strategy (STS) (doc and website)
- STS Appendix (especially the table of actions by year)
- Oregon Transportation Emissions website (categories of actions, embodied in the 6 categories/report cards).
- Place Types overview, back page VMT per capita based on different land use types from Oregon OHAS survey.
- Oregon Scenario Plans to date (bottom drop down) to help identify actions that move GHG/VMT: Metro Climate Smart, Central Lane, Corvallis, RV, AAMPO)
- Scenario Planning Guidance, GHG Calculation Appendix – good background on target rule

The purpose of this document is to flag limitations of and considerations for existing travel demand modeling tools to help inform future modeling and analysis guidance related to CFEC rules.

AVAILABLE TOOLS SUMMARY

Multiple analysis tools and processes may be combined to provide information around greenhouse gas (GHG) reductions, as documented in *Oregon Greenhouse Gas Modeling and Analysis Tools.* ODOT has adopted the "STORM" acronym (Strategic, Tactical, Operational, and Reporting/Monitoring) to describe the range of analysis that may be considered throughout the planning cycle. Figure 1 summarizes how various analytical tools in Oregon fit into the STORM framework.

This document and review focuses on the Statewide Integrated Model (SWIM) and regional travel demand models at the Tactical level, especially as it relates to long-range planning. Both tools are discussed in more detail in the following sections of the memorandum.

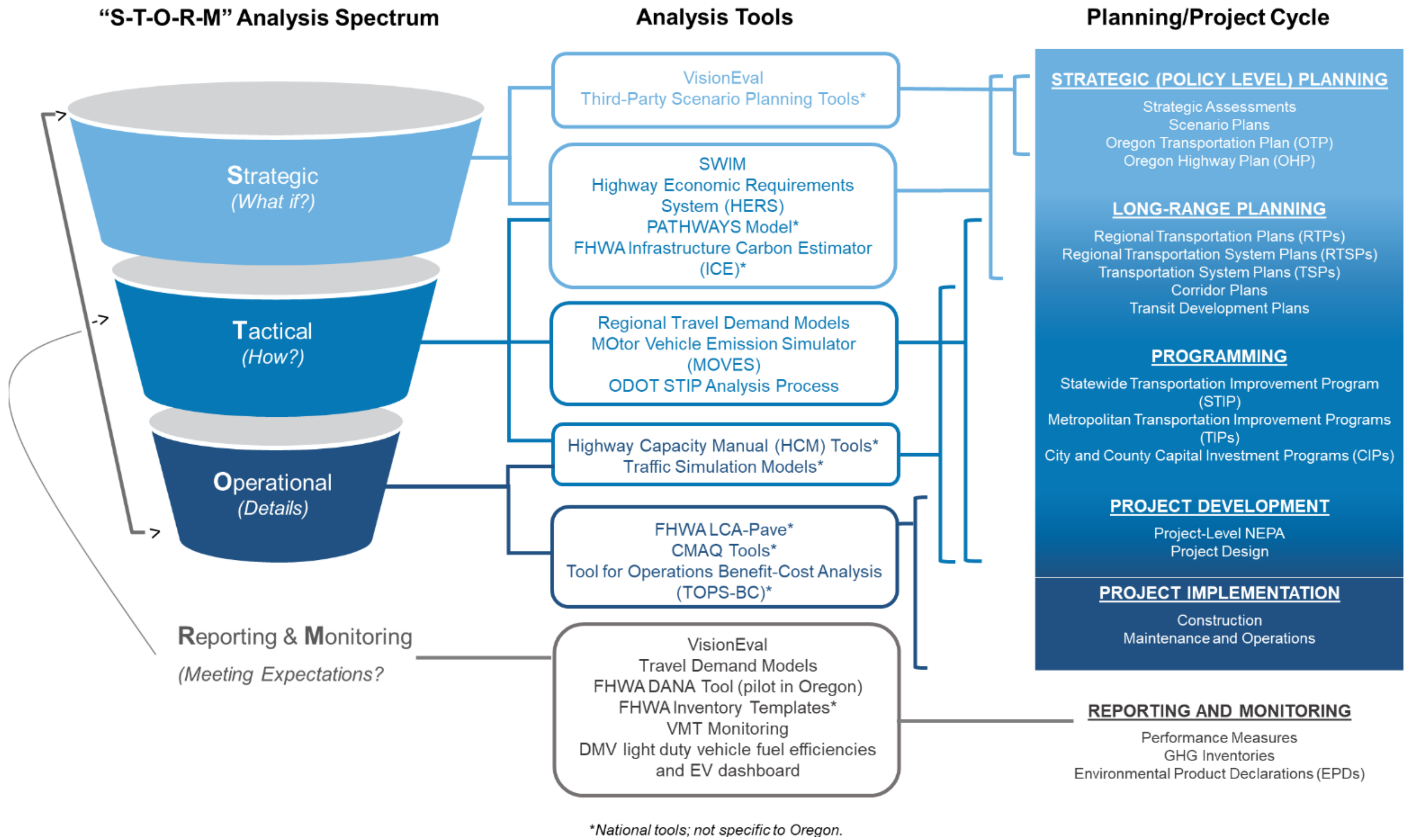

FIGURE 1. RELATIONSHIP BETWEEN STORM ANALYSIS FRAMEWORK, ANALYSIS TOOLS AND PLANNING/PROJECT CYCLE

Source: Transportation Related Greenhouse Gas Modeling in Oregon

CFEC MODELING NEEDS

TECHNICAL MEMORANDUM #1: OAR REVIEW **(TM #1) SUMMARIZED KEY CFEC RULE CHANGES THAT COULD POTENTIALLY REQUIRE NEW OR MODIFIED ANALYSIS AND PROCEDURES GUIDANCE. BASED ON THE REVIEW IN TM #1 AND DISCUSSIONS WITH THE PROJECT ADVISORY COMMITTEES,**

Table 1 summarizes some of the CFEC modeling needs and key discussion questions specifically related to travel demand modeling raised by the project advisory committees.

TABLE 1. CFEC MODELING NEEDS AND KEY DISCUSSION QUESTIONS

MODELING OBJECTIVE	MODEL ELEMENT CATEGORY	TOPIC	KEY DISCUSSION QUESTIONS AND CONSIDERATIONS

1. CALCULATE VMT PER CAPITA	Inputs	Mode shift	• How sensitive are models to mode shift?
			  ◦ Consideration: Typically, models are less sensitive to factors affecting mode split, particularly in smaller urban areas with relatively low congestion.
			• How can pedestrian, bicyclist and transit improvements be captured in the model or through a post-processing adjustment in a way that will influence VMT results?
			  ◦ Consideration: Transit improvements are reflected in the transit network coding, which increases the relative attractiveness of the transit mode. Bike and ped improvements are not generally reflected explicitly as a routable network detail (e.g. sidewalk or bike treatment) that incorporates path choice based on factors. Therefore, transit improvements could be expected to have some effect on the model's estimates of VMT, while bike and ped improvements would not. Off-model adjustments for the bike and ped modes may involve some type of adjustment to the person trip matrices output by the mode choice models for these modes using assumed values, but this would be unreliable. However, ABMs use "all streets" or "all facilities" networks for bike and ped pathbuilding to feed LOS into mode choice even if they don't explicitly assign bike and ped trips. This creates ABM sensitivity to bike/ped infrastructure that can be applied to CFA scenarios.

1. CALCULATE VMT PER CAPITA	Inputs	ITS/TSMO/pricing	• How sensitive are models to ITS/TSMO/pricing strategies? How can these improvements be captured in the model or through a post-processing adjustment in a way that will influence VMT results? ◦ Consideration: ITS and TSMO strategies are not explicitly represented in the models, so the models are not sensitive to these measures. The models would be

MODELING OBJECTIVE	MODEL ELEMENT CATEGORY	TOPIC	KEY DISCUSSION QUESTIONS AND CONSIDERATIONS
			somewhat sensitive to pricing strategies. An operational model (such as DTA-type model) would be needed to adequately reflect these strategies, either in the assignment step only, or in prior steps by adding a feedback loop from the assignment step. A variable pricing strategy such as a VMT fee or a fixed cost strategy such as a congestion toll could be added to the existing auto operating cost variable in the models.
1. CALCULATE VMT PER CAPITA	Outputs/ Results	External trips	• How are trips outside of the model captured? What integration is needed with the Statewide Integrated Model? ○ Consideration: While SWIM has been used to derive external estimation, trip length distribution for external trips may introduce additional complexities.

1. CALCULATE VMT PER CAPITA	Outputs/ Results	Household vs. home-based VMT	• How is the universe of household trips defined and how is that measured using the travel models? At what resolution is VMT/capita reported – by TAZ, by CFA, or Citywide?
			  ○ Consideration: Will need consistent agreement on aligning the policy intent of OAR with model capabilities and assumptions that address limitations.
			  ○ Consideration: MPO model's capabilities vary in this regard: ABMs can attribute VMT to invidual travelers and thus enable summaries on any desired dimension while TBMs are more limited in how VMT may be attributed. Defining a consistent reporting framework at a universally feasible aggregation level may be useful.

2. CONSISTENCY ACROSS MODELS	Inputs/Outputs		• What are critical input and output elements for standardization? ○ Consideration: There are likely a mix of model inputs and assumptions that should be identified through the CFA framework and refined through case study applications. Methods for measuring VMT/capita output should be identified and consistent.

MODELING OBJECTIVE	MODEL ELEMENT CATEGORY	TOPIC	KEY DISCUSSION QUESTIONS AND CONSIDERATIONS
			◦ Standardization of the approach for auto operating costs, also recognizing that auto operating costs have been benchmarked using inflationary data, but that the baseline is 1995 in some cases. ◦ Consideration: beyond auto operating costs there are a variety of cost and other variables (e.g. parking, reliability) that may or may not be present in the various MPO models. The guidance should address what may be done across the variety of model capabilities. ◦ Integration of new data from the Oregon Household Survey (OHAS) and changes post-pandemic.
3. IMPLEMENT CFAS	Inputs	Demographics	• How can demographic information/assumptions used in travel demand modeling support CFEC equity analysis? ◦ Consideration: For trip-based models, TAZ household data is stratified by income group (low, medium, and high). This could be used to develop accessibility measures for low income households. Person trip matrices by income group are produced by the destination choice and mode choice models. This could be used to identify travel patterns by mode for low income households. ABM provide additional opportunities for equity analysis. Other factors commonly included in the models include age of household and size of household. There are other demographic factors that may be identified through census or other datasets that may impact household travel but are not directly coded in the models, including minority populations, disabled populations, and limited English households. • What is an appropriate procedure for maintaining control totals when implementing a CFA, particularly when transportation analysis zone (TAZ) boundaries may not align with CFA boundaries? ◦ Consideration: The control total for a specific jurisdiction would be maintained by subtracting from

MODELING OBJECTIVE	MODEL ELEMENT CATEGORY	TOPIC	KEY DISCUSSION QUESTIONS AND CONSIDERATIONS
			the non-CFA's the added number of households and jobs within a CFA resulting from higher density development. Do control totals need to be reevaluated for market considerations that could be introduced by CFAs? Do demographic inputs need to be updated in other areas of the model? While maintaining a population control total, the number of households may change to reflect household size changes. • What is a way to streamline the process for converting zoning requirements for CFAs into model inputs at the TAZ level, particularly when TAZ boundaries may not align with zoning boundaries or CFA boundaries? ○ Considerations: Consider spreadsheet tools to address calculations. Are integration with other planning tools (e.g., Placetypes) needed?
3. IMPLEMENT CFAS	Inputs	Network Coding	• What model coding changes are needed to the transit network and pedestrian/bicycle to capture the intent of CFAs (walkable, bikeable and served by transit in a way that influences mode shift)? ○ Considerations: Transit coding changes may include: 1) Adding new transit lines or line segments; 2) Adding walk connectors; and 3) Adjusting transit coverage factors for households and employment. There would be no coding changes for the bike and walk modes for most trip-based models, because the bike and walk networks are not explicitly represented in the models. For these modes, zonal accessibility variables are incorporated to represent the effects of the environment in which travel decisions are made. Activity Based Models do encode all facilities and skim the networks for mode choice.
		Parking pricing	• How should parking pricing be modified to reflect new CFEC parking requirements?

MODELING OBJECTIVE	MODEL ELEMENT CATEGORY	TOPIC	KEY DISCUSSION QUESTIONS AND CONSIDERATIONS
			◦ Considerations: On-street parking pricing and residential parking permits ◦ Consideration: guidance may want to address how to create/use sensitivity to parking supply (capacity) independent of cost
3. IMPLEMENT CFAS	Outputs/ Results	VMT	• How sensitive is VMT to CFA changes in the models? ◦ Considerations: CFA elements that the models could be sensitive to are: 1) transit improvements; 2) closer proximity of households to jobs and shopping; 3) parking pricing; 4) increased auto operating cost via a variable fee, such as a VMT charge. In general, the models are not very sensitive to these factors, i.e., the models' estimates of VMT reduction from these changes would not likely be as high as expected.
OTHER	Outputs/ Results	Development review performance measures	• What other modeling attributes should be updated to account for development review performance measure requirements? ◦ Considerations: This will be revisited through the toolbox of performance measures that aligns with the eight objective areas.

IN ADDITION TO THE COMMITTEE DISCUSSION TOPICS PROVIDED IN

Table 1, a review of other resources identifies the following limitations and needs related to using travel demand models (TDMs) to address CFEC rules:

- **Regional Travel Demand Models**
  - Per *Oregon Greenhouse Gas Modeling and Analysis Tools:*
    - Trip-based tools lack detail around certain GHG policy actions like, travel demand management and new pricing policies.
    - TDMs hinge on observed data, making it a challenge to predict how individual behavior might shift given new travel modes like mobility-as-a-service or new technologies like automated vehicles.
    - Depending on the year the model was developed, some TDMs are not truly reactive to policies that would fundamentally change how a household travels due to aggressive transportation demand management interventions, such as reducing the number of trips, trip-chaining, driving shorter distances, changing the time that trips are taken, or greater use of certain modes. Using older generation travel demand models may result in somewhat higher vehicle miles traveled (VMT) than should be expected under these policies if post-processing methods are not employed.
    - Oregon TDMs are not currently designed to address large paradigm shifts, such as large changes in pricing (both tolls and fuel), how electric vehicle (EV) adoption might change, the impact of changing gas prices, or how automated vehicle (AV) adoption might shift current travel behavior norms.
    - TDMs are not generally suitable for evaluation of site-specific factors, such as intersections, access control or intelligent transportation system (ITS) facilities. These tools do not typically account for non-reoccurring congestion (i.e., weather, crashes) and thus underestimate benefits of ITS policies and their GHG impacts.
  - Per *Transportation Related Greenhouse Gas Modeling in Oregon:*
    - TDMs are currently set up to evaluate a different VMT definition than the definition in OAR 660-012, which more closely aligns with the VisionEval tool.
      - More broadly, there are several alignment issues between TDMs and VisionEval (different base years, different VMT definitions, assumptions about state-led actions (pricing policy assumptions), cost assumptions, different sensitivities to mode shift, different ways to account for TNCs and urban deliveries.
    - TDMs are generally not sensitive to alternative modes, land use alternatives and new mobility services. However, ABMs have more capabilities in these areas.
    - TDMs do not directly address the impacts of travel demand management programs.
    - TDMs have limited freight modeling capabilities.
    - TDMs do not capture fleet and fuel actions.
    - TDMS do not capture TSMO/ITS strategies.
    - Trip-based models do not capture seasonal/tourism related travel.
    - SWIM covers intercity-travel and induced demand land use feedbacks that affect GHG not captured by MPO models and better integration may be needed to help align with the VMT definition.

- Off-model tools are likely needed to account for GHG impact of smaller mode (micro transit, community connectors, job shuttles, pedestrian and bicycle networks, and quality/frequency/availability of all of the previous modes, etc.) modal investments.

- **Statewide Integrated Model (SWIM) and Statewide Modeling Needs/Consistency**
  - SWIM forecasts travel characteristics, including intercity and rural travel, which are needed for comprehensive GHG analysis and integration into the MPO models may be needed to align with the VMT definition.
  - Consistent induced, latent, diverted demand assumptions and associated impacts on GHG are lacking due to variations in model size, populations, and datasets used for model validation. Most TDMs, if implemented with appropriate feedbacks (e.g., feedback on trip generation, trip destination and mode split) can capture most short-term induced/latent/diverted demand within the model area. Further impacts are captured in feedbacks when combined with land use models, and may require covering a larger area, such as ODOT's SWIM model, LCOG urbanSim tool, or past use of the Portland Region's Metroscope land use model.
  - There is a need to develop consistent future reference scenario assumptions for household size distribution, income, age, electric vehicle adoption, fuel price and pricing policies. Assumptions affecting VMT and GHG forecasts should be consistently applied in state and regional travel demand models. This will improve comparability of findings from different geographic areas and allow a statewide roll-up of forecasted performance information for policy makers. Understanding uncertainty/risk in modeling would benefit from a consistent approach across the state.

STATEWIDE INTEGRATED MODEL (SWIM)

Oregon's Statewide Integrated Model (SWIM) provides an opportunity to estimate interregional travel that occurs outside of the regional travel demand model area.

"SWIM is a powerful analysis tool that can evaluate the effects of statewide policy actions related to GHG. SWIM simulates regional and statewide activities for land use, transportation and economic interactions. The model forecasts travel characteristics, including intercity and rural travel, which are needed for comprehensive GHG analysis."[1]

SWIM includes various sub-models, including Economy, Businesses, Markets, and Population. These models interact to provide a better estimate of real-world conditions where information between these various systems can be shared.

SWIM relates to regional travel demand models through the External Model.[2] The SWIM External Model runs a select link analysis for each external link in a regional model network and provides trip proportions for the flow through the network (external-external), into the network (external-internal), and out of the network (internal-external). These proportions are used to inform the distribution trends in a specific regional model but do not provide the exact traffic volumes.

---

[1] Oregon Greenhouse Gas Modeling and Analysis Tools, Oregon Sustainable Transportation Initiative, December 2018

[2] https://github.com/RSGInc/SOABM/wiki/external-model

SWIM is being explored to see how it can be used to inform issues around induced, latent, diverted demand for projects, but the project needs to be of significant size (e.g., $100M) in order to be sensitive to these changes within the model.

SWIM has been used to estimate the status of stations external to regional metropolitan models in the past, however the application of this data and how it has been applied likely varies by region.

SWIM has recently been applied to estimate Vehicle Miles Traveled (VMT) for the following projects.[3]

- **Greater Idaho Truck VMT (2023)** – Applied to provide the heavy truck share of total statewide VMT. SWIM provided VMT by vehicle class for each county.
- **Statewide Traffic Volumes to Support STIP GHG Analysis (2022)** – Applied to estimate the impact of STIP projects on VMT. SWIM provided VMT estimates for all National Highway System roads.
- **Truck VMT from States East of the West Coast (2022)** – Applied to understand the percentage of trucks entering from statewide external zones, in this case along I-84 and US95, that originate in eastern states. SWIM provided proportions of truck VMT along Oregon roads entering from the east versus total truck VMT.
- **VMT Area Analysis (2021)** – Applied to inform how VMT could be used as a metric in Greenhouse Gas (GHG) goals. Three different VMT metrics were calculated, internal personal auto VMT, household VMT, and area roadway VMT.

As demonstrated by the recent applications above, SWIM can be used to calculate VMT for statewide external zones, internal areas (such as MPOs), and regional model links. The External Model tool provides an output table by trip which includes a home zone, zone origin, zone destination, and station number (external). With this information the internal-external trips from a regional model TAZ could be tracked beyond the extents of the regional model boundary to calculate the total VMT outside of the regional model network.[4]

REGIONAL TRAVEL DEMAND MODELS

TRADITIONAL FOUR-STEP MODELS

INTRODUCTION

Starting in the mid-1990s, ODOT and the MPOs coordinated their efforts to conduct household travel surveys and to use those surveys to develop a common structure for metropolitan area travel demand models[5]. As a result, most metropolitan area travel demand models in Oregon have similar capabilities and functionality. Most of the traditional four-step MPO models are based on the

[3] https://github.com/tlumip/tlumip/wiki/Applications

[4] https://github.com/tlumip/tlumip/wiki/SL#outputs

[5] Oregon Greenhouse Gas Modeling and Analysis Tools, Oregon Sustainable Transportation Initiative, December 2018

JEMnR (Joint Estimation Model in R) travel demand forecasting model. JEMnR was originally estimated and calibrated for the Portland area by Portland Metro staff and was then used as the basis for development of the Transportation Planning Analysis Unit's (TPAU) models for the Corvallis Area Metropolitan Planning Organization (CAMPO), Bend MPO (BMPO), and Rogue Valley Area MPO (RVMPO)[6]. It also serves as the base for the Salem Kaiser Area Transportation Study's (SKATS) model. The Metro model and the Lane County of Governments (LCOG) model are both based on the "Kate" version of the JEMnR model. Therefore, most of the MPO models will have similarities that will be influenced by modeling guidance related to the new CFEC rules. The following sections describe similarities that will apply to these models followed by differences that will need to be accounted for in any future model guidance.

INPUTS AND OUTPUTS RELATED TO CFEC RULES

The JEMnR Model Base Report[7] provides a comprehensive overview on all topics that are similar to all JEMnR based models operated by TPAU (CALM, BRM, RVMPO). The following table provides a high-level summary of model inputs and outputs similarities that may be influences by new CFEC rules.

[6] JEMnR Model User's Guide, Oregon Department of Transportation, November 2019

[7] JEMnR Model Base Report, Oregon Department of Transportation, 2011

TABLE 2: MODEL INPUT SUMMARY

CATEGORY	NAME	NOTES	RELATIVE IMPORTANCE FOR NEW CFEC RULES	CFEC IMPACT
TAZ SOCIOECONOMIC DATA	Employment by type and total	10 employment categories	HIGH[8]	CFA
TAZ SOCIOECONOMIC DATA	Total households		Varies[9]	CFA
TAZ SOCIOECONOMIC DATA	Proportion of households by size		HIGH	CFA
TAZ SOCIOECONOMIC DATA	Proportion of households by income group		HIGH	CFA
TAZ SOCIOECONOMIC DATA	Proportion of households by age of head of household		HIGH	CFA
TAZ SOCIOECONOMIC DATA	Distribution of area-wide households by size, income, and age of head of household (HIA)	Derived from 2000 Census Public-Use Microdata Samples (PUMS) data.	HIGH	CFA

[8] Employment alone may not be an important variable, but when located in close proximity to large numbers of households, as with mixed-use development, its effects on VMT reduction per capita within a local jurisdiction may be relatively strong. This is particularly true for retail employment.

[9] Households alone may not be an important variable, but when located in close proximity to significant levels of employment, as with mixed-use development, the effects on VMT reduction per capita within a local jurisdiction may be relatively strong.

CATEGORY	NAME	NOTES	RELATIVE IMPORTANCE FOR NEW CFEC RULES	CFEC IMPACT
TAZ SOCIOECONOMIC DATA	Distribution of TAZ households by size, income, and age of head of household	Computed based on: • TAZ households by TAZ • Percentages of households by size, income group, and age of household by TAZ • Area-wide HIA distribution	HIGH	CFA
LEVEL OF SERVICE DATA	Transit travel times (in-vehicle time, walk time, total wait time, initial wait time, transfer time)	Walk time, initial wait time, and transfer time capped at maximum value of 30 minutes.	High	VMT (mode choice)
LEVEL OF SERVICE DATA	Walk mode walk time	Walk time computed based on auto trip distance and assumed average walk speed of 3 mph.	High	VMT (mode choice)
LEVEL OF SERVICE DATA	Interzonal trip distance	Intrazonal distances computed separately from interzonal distances.	N/A	
LEVEL OF SERVICE DATA	Peak/off-peak auto times		Low	VMT (mode choice)

CATEGORY	NAME	NOTES	RELATIVE IMPORTANCE FOR NEW CFEC RULES	CFEC IMPACT
LEVEL OF SERVICE DATA	Drive alone trip cost by trip purpose	Average auto operating cost per mile = $0.091 (1995 dollars).	Medium[10]	VMT (mode choice)
LEVEL OF SERVICE DATA	Drive with passenger trip cost by trip purpose		Medium	VMT (mode choice)
LEVEL OF SERVICE DATA	Auto passenger trip cost by trip purpose		Medium	VMT (mode choice)
LEVEL OF SERVICE DATA	Auto out-of-vehicle time	Walk time from parking location to destination.	Low	VMT (mode choice)
LEVEL OF SERVICE DATA	Bike time	Bike time computed based on auto trip distance and assumed average bike speed of 10 mph.	High	VMT (mode choice)
LEVEL OF SERVICE DATA	Peak/off-peak bus transfers	Number of transfers	Low	
LEVEL OF SERVICE DATA	Bus fare		Low	
LEVEL OF SERVICE DATA	Peak/off-peak park-and-ride impedances (initial wait time, transfer time, walk time, number of		Low	

[10] Importance varies by income group.

CATEGORY	NAME	NOTES	RELATIVE IMPORTANCE FOR NEW CFEC RULES	CFEC IMPACT
	transfers, in-vehicle itme)			
LEVEL OF SERVICE DATA	Park-and-ride trip cost		Low	
ZONAL INPUT DATA	Transit availability indicator	Entire TAZ located outside of ¼ mile transit buffer? (Y/N).	High	
ZONAL INPUT DATA	School TAZs for "home" TAZ	TAZs containing elementary school, middle school, and high school for "home" TAZ.	N/A	
ZONAL INPUT DATA	Number of intersections within ½ mi. of TAZ centroid	Includes local street intersections.	High	
ZONAL INPUT DATA	Percent single-family dwelling units by TAZ	Base year percentages used for future percentages.	Medium	
ZONAL INPUT DATA	Shopping center square footage by TAZ		N/A	
ZONAL INPUT DATA	College vehicle trips	Calculated based on ITE trip rate and total enrollment	N/A	

CATEGORY	NAME	NOTES	RELATIVE IMPORTANCE FOR NEW CFEC RULES	CFEC IMPACT
ZONAL INPUT DATA	Long-term parking cost		Low[11]	
ZONAL INPUT DATA	Short-term parking cost		Low[12]	
ZONAL INPUT DATA	Park-and-ride lot TAZ	Park-and-ride lot TAZ for "home" TAZ; value of zero used for TAZ's with no logical P&R lot	N/A	
ZONAL INPUT DATA	Park acres		N/A	
ZONAL INPUT DATA	Peak/off-peak household transit coverage factor	Percentage of households within ¼ mi. transit service buffer.	High	
ZONAL INPUT DATA	Peak/off-peak employment transit coverage factor	Percentage of employment within ¼ mi. transit service buffer.	High	
EXTERNAL TRAVEL DATA	External station ADT		N/A	
EXTERNAL TRAVEL DATA	Daily external-external trips	Obtained from E-E trip matrix.		

[11] Importance varies by income group.

[12] Ibid.

CATEGORY	NAME	NOTES	RELATIVE IMPORTANCE FOR NEW CFEC RULES	CFEC IMPACT
EXTERNAL TRAVEL DATA	Percent internal-external trips at external station	50% of the non E-E trip ends		
EXTERNAL TRAVEL DATA	Percent external-internal trips at external station	50% of the non E-E trip ends		
NETWORK DATA	Zones	These are not data inputs in the sense of the other data items. Network data are inputs to the auto and transit assignments, which produce the LOS data above used in various model components.		
NETWORK DATA	Links			
NETWORK DATA	Nodes			
NETWORK DATA	Transit Lines			

MPO SPECIFIC CONSIDERATIONS

While many of the MPO models are similar, there are unique aspects to each that may be influenced by the new CFEC rules. The following documents were reviewed to help determine the unique elements of each of the JEMnR models:

- *CALM Model Development Report*, Oregon Department of Transportation, 2018
- *BRM Model Development Report*, Oregon Department of Transportation, 2018
- *Central Lane MPO 2045 RTP Appendix K: LCOG Trip-Based Travel Demand Model Methodology Report*, Lance Council of Governments, December 2020

In addition, staff responsible for the CLMPO, Metro, and SKATS models were interviewed and provided information regarding some of the unique elements of their respective models. Table 3 summarizes these unique elements, including how they may influence outcomes of the new CFEC rules.

TABLE 3: MPO SPECIFIC MODELING CONSIDERATIONS FOR TRIP-BASED MODELS

MODEL	COMPONENT	DESCRIPTION	RELEVANCE TO NEW CFEC RULES
METRO	Freight	The Metro Freight model was updated recently, resulting in a significant increase in medium truck trips.	Depending on how VMT is measured, the freight model may have a significant (all trips) or insignificant (household trips) impact on VMT.
METRO	Pricing	The Metro model currently includes pricing in the Financially Constrained Scenario.	Changes in pricing assumptions can have significant impacts on VMT across the Metro area.
METRO	Park and Ride	The Metro model Park and Ride element includes parking capacity.	Park and ride model elements near a CFA area could increase transit usage and decrease VMT.
METRO	Bike Model	The bike model was developed in conjunction with research and has been used to estimate order of magnitude demand potential for major corridor projects.	The tool may provide the ability to capture bike demand for large and/or package of bicycle improvements, though is likely not sensitive to minor individual projects.
METRO	Peak Spreading	Peak spreading shifts trips off-peak based on the levels of congestion during the peak hour.	Peak spreading impacts VMT across all modeled scenarios.
CALM	University	CALM includes an Activity-Based separate university model that captures Oregon State University related travel.	Land use and network assumptions for CFA designated areas in or near the university campus must consider the travel behavior levers of the university model, which will have a more significant impact on VMT outputs than the standard model inputs.
BRM	Vacation Homes	The numerous second homes in Bend used as vacation rentals are currently modeled	CFA areas with low permanent residency could consider including a

MODEL	COMPONENT	DESCRIPTION	RELEVANCE TO NEW CFEC RULES
		as hotel rooms to capture appropriate trip patterns.	percentage of unoccupied homes as hotel rooms. The trips generated by these hotel rooms likely not be recorded as household VMT.
SKATS	Park and Ride	Similar to Metro model. Zones receive a park and ride location TAZ designation. Trips are not chained (i.e. part of a transit trip).	CFA's near Park and Ride facilities could impact VMT, but without chaining the trips,
SKATS	Premium Transit	Enhanced transit facilities that increase transit attractiveness	Transit stops in CFA areas are likely to use the premium transit designations, particularly for Transit-Oriented Developments (TOD).
SKATS	Peak Spreading	The model contains peak spreading functionality that is not currently in use.	If implemented, peak spreading can impact VMT across all scenarios.
SKATS	Transit	Transit ridership within the SKATS model area has been declining since 2008, and the utility functions within the model have needed several updates to keep pace with this decrease.	Mode choice shifts from personal vehicles to transit in newly designated CFA areas will be constrained by the current decreasing usage trends.
SKATS	Roadway Network	The SKATS model roadway network includes more intersection related (g/c ratio) and cross section (enhanced capacity on 3-lane roadways) elements.	Increased sensitivity to network assumptions throughout the model must be understood and accounted for to provide an effective comparison when pulling VMT related measures.
LCOG	University Model*	Independent model that substitutes in college trips for the University of Oregon. This model captures both on and off campus students and faculty	Land use and network assumptions for CFA designated areas in or near the university campus must consider the travel behavior levers of the university model, which will have a

MODEL	COMPONENT	DESCRIPTION	RELEVANCE TO NEW CFEC RULES
			more significant impact on VMT outputs than the standard model inputs.
LCOG	Bike Model*	The CLMPO model bike mode is fed by a separate bike model. This bike model is built off a network that has not been updated in some time but is intended to reflect some level of bike facility quality.	Bike network improvements included with conversion of areas to a CFA designation may need to be coded in the separate bike model network to estimate benefits. The sensitivity of the bike model tool to these types of changes is likely very low.

Note: *These are unique elements of the travel model that have been developed for the region, however these modules may have limited functionality depending on type of application

ACTIVITY BASED MODELS

From the late 1990s until recently, travel demand model structures in Oregon used a "trip-based" modeling approach.[13] The trip-based methodology has been the best practice standard for many years. Recently, the shared model structure is migrating to a newer recommended methodology which is referred to as an "Activity Based Model" (ABM). The key difference between a trip-based model and an ABM is the treatment of travelers. Trip-based models estimate behavior and travel decisions for groups of households, for example all households within a certain income band in each zone. Trip-based models do not consider person-level characteristics and they are limited in terms of the variables they can utilize and traveler choices they can consider because of this 'aggregate' nature. Activity based models work from a synthesized discrete population for the analysis area, using characteristics about both households and individual travelers. These attributes include contextual details about observed travel choices, enabling estimation of behavioral models that forecast fine grained traveler behavior and decision-making throughout the day. This allows 'disaggregate' modeling.

The higher level of detail adds complexity to ABMs but allows more detailed questions to be tested and more information to be provided in scenarios devised to test those questions. For example, ABMs allow equity to be better assessed via information on how different individuals are specifically impacted. Pricing strategies that can be significantly influential in GHG reduction are also better tested with ABMs through increased person-level sensitivity. In addition, ABMs can provide higher fidelity for analyzing transit and active transportation usage via both disaggregate treatment of individual traveler behavior and more-detailed geographic units of analysis. The latter can be at a

[13] *Oregon Greenhouse Gas Modeling and Analysis Tools, Dec 2018*

"micro zone" or even a parcel scale and support more accurate active transportation travel times and environmental factors.

CURRENT ABM APPLICATION IN OREGON

Specific to Oregon, the ODOT Southern Oregon Activity Based Model (SOABM) is an ABM built for the Middle Rogue and Rogue Valley MPOs. It is based on the Coordinated Travel – Regional Activity-based Modeling Platform (CT-RAMP) family of ABMs and includes 50,000+ persons in Grants Pass and 175,000+ persons in the Rouge Valley urban areas[14]. The SOABM integrates with the ODOT Statewide Integrated Model (SWIM) for external flows, includes a commercial vehicle model, uses open matrix (OMX) for data interchange, Google transit for transit routes, TomTom for observed speed data, and utilizes PTV Group's VISUM for all network level-of-service skimming and zonal data management.

PLANNED ABM APPLICATION IN OREGON

It should also be noted that ODOT will be migrating from CT-RAMP to the ActivitySim framework in the future. ActivitySim is a Python-based open-source platform supported by a consortium of agencies and updated with new features regularly (many of which may be helpful in supporting CFEC Analysis). Oregon's ActivitySim design project is in progress in parallel to this guidance effort and is working to address the CFEC requirements in the evolving ActivitySim specification. Although the design of ODOT's ActivitySim-based ABM is not finalized, it is worthwhile to discuss a number of its potential features that can impact CFEC-related analysis.

In the following sections, we first discuss the main (current and potential future) features of the SOABM, discuss in more detail how these features can be used to support achieving CFEC goals, and call out potential ActivitySim features of note.

ABM FEATURES

Compared to traditional four-step models (trip-based models), the ABM system has a more detailed and accurate representation of space, time, travel patterns, and many more person and contextual explanatory variables. The current SOABM's main distinguishing features include:

- Better representation of non-motorized travel using all-street networks.
- Sensitivity to land use and accessibility effects for auto ownership, tour frequency, and destination choice.
- Sophisticated support for parking costs and various road pricing scenarios.
- Auto ownership sensitivity to household and personal characteristics.
- Better representation of trip chaining behavior and non-home-based travel (all trips are part of tours and can be tracked back to the person making those trips and the household that person belongs to).
- Better representation of decision-making and interactions among household members.

---

[14] https://github.com/RSGInc/SOABM/wiki

- Mode choice sensitivity to household and personal characteristics as well as level of service by each mode.
- Time of day choice sensitivity to congestion and time-of-day-specific policies (e.g., variable tolling).
- Population synthesizer tools for future scenario modeling.

SUPPORTING CFEC RULES THROUGH ABM APPLICATION

The levers policymakers could choose to reduce VMT in CFAs and to which the SOABM is sensitive can be categorized in three main groups of variables:

- Land use (built environment)
- Transportation infrastructure
- Transportation policy

Land Use Category

The main land use variables used in SOABM and their impacts on model outputs are outlined in *Table 4* below. Note that this list excludes the typical size term variables used in location/destination choice models. Note that accessibility measures are arguably a mixed measure of land use and transportation infrastructure characteristics but are included here for easy reference. Similarly, dwelling unit types are more a characteristic of a household, but at an aggregate level can provide inputs for land use development, hence their inclusion here.

TABLE 4 LIST OF MAIN LAND USE VARIABLES USED IN THE CURRENT SOABM

MODEL	VARIABLE	DETAILS
Auto Ownership	POPULATION DENSITY	Increased population density at the origin zone POSITIVELY associated with fewer vehicles owned by household
Auto Ownership	DWELLING TYPE	Detached single family homes POSITIVELY associated with more vehicles owned
Auto Ownership	RETAIL DENSITY	Increased retail density at the origin zone POSITIVELY associated with fewer vehicles owned by household
Auto Ownership	ACCESSIBILITY MEASURES	Higher non-motorized accessibility measures are associated with fewer vehicles owned.
Coordinated Daily Activity Pattern	DWELLING TYPE	Detached dwelling units are positively associated with not making any tours during the day
Coordinated Daily Activity Pattern	ACCESSIBILITY MEASURES	Higher retail access positively associated with making a non-mandatory tour

MODEL	VARIABLE	DETAILS
Tour Frequency	ACCESSIBILITY MEASURES	Higher accessibility measures generally positively associated with more tours
(TOUR/TRIP) MODE CHOICE	PARKING COST	Higher parking costs negatively associated with driving modes
(TOUR/TRIP) MODE CHOICE	ORIGIN EMPLOYMENT DENSITY	Higher density positively associated with more walk/bike, no impact on transit
(TOUR/TRIP) MODE CHOICE	DESTINATION EMPLOYMENT DENSITY	Higher density associated with more walk/bike, no impact on transit
(TOUR/TRIP) MODE CHOICE	ORIGIN HOUSEHOLD DENSITY	Higher density associated with more walk/bike, no impact on transit

The rich set of land use variables in the SOABM enables analysis of a number of strategies that could decrease VMT. These include policies that would reduce auto ownership and switch mode share away from auto modes, increasing density, concentrating amenities (jobs, shopping, recreation sites, etc.), and encouraging mixed-use development.

Transportation Infrastructure Category

Transportation infrastructure scenarios include physical changes to the transportation networks that affect travel behavior via connectivity and the supply of travel options. The current SOABM uses a three-zone system (TAZ, MAZ, TAP) to represent highly detailed connectivity. The Traffic Analysis Zone (TAZ) is used to analyze auto travel times, costs, and vehicle assignment to the road network. The Micro Analysis Zone (MAZ) is used to represent non-motorized (walk and bike) travel times. The Transit Access Point (TAP)--a representation of a collection of transit stops--is used to analyze transit travel times and costs from the initial boarding stop to the final alighting stop, and assign transit trips to the transit network. Transit walk access and egress are represented between MAZs to TAPs along a non-motorized network. This geographic detail allows the ABM to analyze changes in travel behavior and VMT not only for large-scale investments in transportation infrastructure such as freeway capacity but also new or reconfigured transit services, increases in transit service frequency, changes to the built environment, and the provision of non-motorized infrastructure.

The SOABM's zonal detail is supported by corresponding network detail. This includes three transportation networks:

- Transit network: The transit network is coded for each of five time periods. Transit trips are modeled between first boarding and final alighting TAPs. Transit walk access and egress are obtained from the All-Streets network. These features allow to better represent actual walk access to and from transit compared to a more aggregate TAZ system.

- All-streets and non-motorized network: Active modes are modeled between MAZs using a non-motorized network that includes all streets plus all off-street active transport infrastructure. This enables analyzing facilities off the road network to represent bicycle infrastructure. It could also include elevation.
- Roadway network: the road network is based off a NAVTEQ network that includes freeway, arterial, local and in some locations even private roads. The treatment of the highway networks is the same the same between ABMs and TBMs.

Transportation Policy Category

Transportation policy changes such as transportation demand management and road pricing can change travel behavior to achieve different outcomes in travel patterns including changes in travel frequency, mode choice and/or departure time.

- Congestion pricing: ABMs function at the level of individual persons; choices are tracked for each person and can influence subsequent choices. There are time-of-day choice models that schedule each tour into available time windows. These models include variables that represent multi-modal accessibility; changes in the time or cost of a mode will influence when travelers choose to travel. The effects of peak period pricing can influence when travelers schedule their travel and the length of trip they are willing to make.
- Detailed representation of parking costs and work-from-home choice options can support some Transportation Demand Management scenario analyses, for example parking cash-outs by employers and promoting flexible or work-from-home work schedule options. Scenarios that employ these strategies would impact traveler mode and destination choices with resultant effects on VMT.

Outputs

The outputs directly relevant to CFEC VMT and emissions analysis include modeled link volumes by vehicle class, travel time, and distance in the congested highway network from highway assignment and skimming. These outputs can be exported from the model to calculate VMT and GHG emissions using MOVES or other means. These are similar to the outputs from trip-based models.

In addition to network outputs the SOABM (and all ABMs) retain complete data on every traveler's trip-making during the modeled day. This can support detailed analysis of behaviors by different population subgroups that can suggest ways to alter input scenarios to better achieve VMT reduction goals.

TOOL LIMITATIONS FOR CFEC ANALYSIS

Previously Identified Limitations

The current SOABM does not have some of the capabilities that are available in other ABMs and *may* be chosen for Oregon's ActivitySim implementation for evaluating policy impacts. These are discussed below under *MPO Specific Considerations.*

Additional Observations

While all travel models require careful and thoughtful input data preparation, ABMs require the creation of a synthetic population consistent with the land use inputs for each analysis year. The ability to assess policies is dependent on the household and individual characteristics present in the synthetic population, so it may be necessary to rebuild it to analyze various desired scenarios. Tools exist to aid this process and while it is conceptually similar to preparing the zone-level household demographic distributions typically used in trip-based models, it does require some knowledge and training. For example, population synthetization uses person-level control variables in addition to household-level controls.

MPO SPECIFIC CONSIDERATIONS

In addition to the core passenger travel treatment in ABMs, auxiliary models integrated with the ABM may be relevant to CFA analysis:

- Special generators such as universities, airports, and visitor sub-models might not have sensitivity to some policy levers. Further investigation is required to determine if additional analysis or post-processing is required to capture VMT and GHG reductions.
- Commercial vehicle policies such as pricing or restrictions can affect routing and VMT. It is generally assumed that the commercial vehicle demand will not change, but their routing, and their impacts on congestion can change and is captured in the assignment step. The SOABM includes a commercial vehicle treatment.
- External demand is generally assumed to be insensitive to policies but their routing and impacts on congestion can change and is captured for in the assignment step.

Finally, as previously described the SOABM is the only current fully operational ABM in Oregon. However, Metro has a prototype instance of a CT-RAMP model based on SOABM and the Oregon Model Statewide Collaborative (OMSC) is in the process of crafting an ActivitySim specification for a next-generation ABM. The intent is that ActivitySim will be a common framework across the state. ActivitySim is a modular design and it is possible that the MPOs will customize their ActivitySim instances. For all these reasons it is useful to note relevant *possible* features of the future ActivitySim ABM with the understanding that the design is not final, so these are *potential* rather than actual:

- Disaggregate accessibility (ability to reach jobs or attractions) to provide added sensitivity to household characteristics such as auto ownership and income.
- Vehicle ownership model that could test how adoption of automated vehicles change GHG emissions.
- Vehicle type model provides sensitivity to vehicle age and fuel type that affects GHG emissions.

- Transit pass ownership and transit subsidy models that would provide sensitivity to transit fare policies that can affect behavior differently across different demographic segmentations.
- Telecommuting and work from home models that provide sensitivity to travel demand management policies.
- Micro-mobility and TNC modes in tour and trip mode choice models that add more travel options for travelers.
- Value of time segmentation that provides more sensitivity to tolling and pricing strategies for tour and trip mode choice, and assignment path building.
- Parking supply constraints
- Free parking eligibility and parking location choice sub models

ATTACHMENTS

The following attachments are provided:

- OMSC MTP Model Summary
- MPO Modeling Discussion Notes

This matrix is a discussion aid for the OMSC's MPC subcommittee. It provides an overview of models that are being actively maintained and developed by ODOT and the large MPOs. The purpose is to help the MPC identify any collaborative model development opportunities that may be on the horizon. The document prints at 11 x 18. Modeling agencies, when updating your info, please be sure to indicate the date of update at the top of the column.

Oregon Modeling Steering Committee

Modeling Program Coordination Subcommittee

INVENTORY OF MODELS AND MODEL DEVELOPMENT PLANS

MODEL TYPE	ODOT REGIONAL MODE: CALM, BRM, RVMPO, SOABM (AS OF JULY 2023)	ODOT STATEWIDE (AS OF JULY 2023)	PORTLAND METRO (AS OF JULY 2023)	SKATS (AS OF JULY 2023)	LCOG (AS OF JULY 2023)	POTENTIAL MODEL COLLABORATION WITH OTHER OMSC AGENCIES
CURRENT MODELS	JEMnR code base for BRM and CALM (Metro Estimation calibrated to OHAS data, both converted from emme to Visum for Traffic assignment). • University model (CALM) • Commercial Veh Model (BRM / CALM) SOABM deployed for MRMPO	SWIM 2.5 regularly used in Applications including STIP https://github.com/tlumip/tlumip/wiki/Applications VE - State received upgrades from the OTP - driverless, shared TNC, Telework, and multi-modal modules with safety and health outputs HERS - OR is a new version based on HERS-National that is supported by FHWA; in use for project analysis, STIP, B/C, congestion analysis, and performance measures. Post-processor provides link speed distribution for SWIM & HERS.	Kate model – applying latest calibration of model (v3.0) to current RTP (2023) Multi-Criterion Evaluation (MCE) tool Tour-based freight model Initial version of ABM (based on SO-ABM) Regional VisionEval Model is in place for Metro region Dynamic Traffic Assignment deployment at large, sub-regional scales (~⅓ region)	JEMnR code base (OHAS 2010 Estimation) with peak-spreading as an option. Transit revised using OnBoard (2013)	Kate travel model in use. No updates in progress. UrbanSim Land Use Model in use. No updates in progress. VisionEval model for Strategic Assessment	See Model Development rows below.
MODEL *APPLICATIONS* NEXT TWO YEARS	BMPO RTP - 2024 SOABM has been in application since the adoptions of MRMPO/RVMPO RTPs and will be in application until next RTP updates in 2024 and 2025, respectively.	SWIM 2.6 will be the working model and the foundation for the OHP and statewide work moving forward from the new OHP. VE has developed a foundational reference scenario used for the OTP	Continued application to RTP (2023) Project-level application, including RMPP, IBR, Westside Multimodel Study, several corridor level studies	Likely use in TSP updates for Keizer, Salem, and Turner. Unknown needs for regional scenario planning (local lead for TSP updates).		See Model Development rows below.

MODEL TYPE	ODOT REGIONAL MODE: CALM, BRM, RVMPO, SOABM (AS OF JULY 2023)	ODOT STATEWIDE (AS OF JULY 2023)	PORTLAND METRO (AS OF JULY 2023)	SKATS (AS OF JULY 2023)	LCOG (AS OF JULY 2023)	POTENTIAL MODEL COLLABORATION WITH OTHER OMSC AGENCIES
MODEL DEVELOPMENT: **NEAR-TERM 0-2 YEARS**	Joined and contributing in ActivitySim development ActivitySim Estimation / Implementation Contracting Continuing to develop Modeling and ABM guidance and procedural documents (0-10+ years out).	SWIM development will be focused on maintenance/minor activities VE-State development largely moved to pooled fund HERS-OR - establish plan to regularly update, based on FHWA updates of National version.	ABM development Continued regional / large sub-regional DTA development Kate model enhancements to transit assignments Updates to Bike model Land use model development (UrbanSim?)	ABM development and implementation after HH Survey in 2024 as per the ActivitySim Coordination Group Refinement of transit modeling with stop level data. Aligning with SAMTD"s TBEST model as appropriate (mainly inputs). Maintain existing four-step until ABM is ready for use (and possibly used for consultant requests - TBD) VE-RSPM for CFA related work (consultant developed)	Utilize models as needed for regional planning and project level analysis. Conduct OHAS and update models with results. Prepare models for next RTP update (due January 2026) Continue ABM/ActivitySim collaboration. Likely will use current models for the next CLMPO RTP update.	0-2 Years: • Peak spreading methodology (ODOT and Metro) • MCE • Continue ABM/ActivitySim collaboration (ODOT, Metro and SKATS) • Application guidance • Land use forecasting • Emerging tech evaluation (including C/AV modeling) • "Big Data" evaluation • Telework/telecommerce modeling • Bike/ped data • OHAS and Covid travel behavior data
MODEL DEVELOPMENT: **INTERMEDIATE 2-5 YEARS**	Move from statewide joint estimation, to individual ActivitySim implementations. CALM could be the first ODOT MPO region to shift. Will likely be building off of add-on survey work to do some development around e-commerce	New data sets and model enhancements will continue to be evaluated. TPAU will continue to align model development with the needs of the state. Current effort relates to RITIS platform for speed data.	ABM application Integration of MCE, ABM, DTA, and Freight models	• Integrating the MCE tool • Freight modeling	Determine transition to ABM (how and when) Update travel and land use models for next RTP update (due January 2026) Continue using VisionEval for scenario planning.	2-5 Years: • Improve bike modeling (align ActivitySim with Metro's bike modeling work?) • Develop models for New MPOs • Freight models - aligning SWIM with Metro's freight model, esp. land use components • Commercial models • VisionEval / scenario planning tools
MODEL DEVELOPMENT: **LONG-TERM 5-10 YEARS**	All MPOs to use ABM - planned to be ActivitySim. Continued Development in ActivitySim	Explore design of SWIM 3.0, next generation statewide model SWIM 3.0 would benefit from a statewide joint estimation for Oregon	ActivitySim, continued integration with DTA, explore Dynamic TRANSIT assignment	Adding Freight traffic and commercial vehicles	Continue ABM/ActivitySim collaboration.	5-10 Years: • Transition all MPOs to ABM framework.