TECHNICAL MEMORANDUM #5

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SUBJECT: TPR Modeling and Analysis Guides Update
           Tech Memo #5: CFEC Guidance Framework   Project #22129-005

CFEC GUIDANCE FRAMEWORK

This memorandum summarizes a high-level framework that identifies modeling and analysis elements to address through the CFEC modeling requirements, including climate friendly area (CFA) case studies. Analysis procedures will be identified and deployed through case studies for each of the CFA elements.

This framework is generally based on the application of trip based travel demand models, which are used in the majority of metropolitan areas in Oregon. Items that are assumed to vary (or be additive) for activity based models (ABM) are flagged.

Additional considerations and notes for some topics are attached based on an ODOT worksession.

CFA FRAMEWORK ELEMENTS

0. **CFA Identification** (Pre-analysis: CFA Methods Guide: https://www.oregon.gov/lcd/CL/Documents/ClimateFriendlyAreasMethodsGuide.pdf)
   a. Note: Acknowledging these critical steps here, but initial work to define comprehensive plan designations and policies is assumed to fall outside the modeling and analysis scope. **Coordination and guidance from local agency staff will be key to ensure that models and analytical tools reflect local assumptions, plans, and policies.**
1. **Reference Inputs** – Develop Consistent Assumptions (OMSC GHG Subcommittee Strategy C2[1])
   a. Future Year

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[1] Strategy C2: Develop consistent future reference scenario assumptions for income, electric vehicle adoption, fuel price and pricing policies https://drive.google.com/file/d/159CIi4qOTc9LhdNG2S5J27aImx8jkW9m/view

i. **Population totals** (PSU's Population Research Center)
   ii. Initial **CFA Incorporation Efforts** for planning horizon year (Provided as Element 0), which may be for 2045 or 2050
b. **Inflation Adjusted** Inputs (All monetary inputs use common CPI table/method to convert to appropriate model year)
c. **Auto operating cost** ($/mile): Electrification, fed/state/local gas tax, or OReGO, insurance, DEQ regulations surcharge, etc. see SOABM to start. Alternative forecasts to test (OTP) – *Note that these are generally statewide considerations and ODOT to provide guidance and develop defaults)*
d. **Other PopSim inputs** (PRC, Occupation mix, housing mix, HH size, presence of kids)
   i. Note: population control totals are at the jurisdictional level. The HH mix by type (SF/MF) would be governed by the zoning and be an input at the TAZ level. PopSim would then allocate (as an output) HH population characteristics at the zone level.
e. **Income growth** (future)
f. **Value of time** (future)

2. **Land Use Steps** *(Conducted for Base and Future Year)*
   a. Translation of **CFA Planning Info** (Information from Element 0)
      i. Identify representative TAZs
         1. Determine if TAZ need to be split (base and future year)
      ii. Identify CFA Buildout (households and employees by zone) [pull from prior DLCD work noted above] this should an identification of the ultimate development capacity based on zoning and densities and is not restricted to occurring during the planning horizon.
      iii. Market Assumptions (how much of CFA develops in plan horizon)
      iv. Adjust land use outside CFA to maintain pop projections (if needed)
   b. **Land Use Demographics**
      i. **PopSim Set up and Run**– Set up and run for 3 levels of controls, first cut modifications from current SOABM[2].
         1. Region/Jurisdiction (PRC control totals (persons by age group and persons by occupation types 1 through 6)
         2. CFAs (30% PRC HHs per CFA, average housing mix expected at CFA densities) [Note: This is primarily used as back check and datapoint – not necessarily market conditions]
         3. TAZ (Zoning capacities, HH by income, HH by size, workers per HH, presence of kids)
      ii. **PopSim Controls Validation** (see chart in attachment) to determine:
         1. How well were controls achieved
         2. Do we meet CFA minimum HH densities
         3. Other QC tests
      iii. Aggregate **PopSim results to TAZs** for
         1. Place Type input (HHs)
         2. Various JEMnR 4-step inputs
         3. Check TAZ population totals to match overall PRC total
      iv. **Run Place Types** (run, create maps, and interactive viewer to aid in QC process checks)
         1. Other TAZ Inputs
            a. Employment (total and retail/service) from local input

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[2] https://github.com/RSGInc/SOABM/wiki/Running-the-Population-Synthesizer

b. Intersection Density/Design D (OpenStreetMap for base year and Metro methods)
c. Unprotected acres by TAZ (documented methods)
d. (optional) Transit D (GTFS-based calculation, US EPA Smart Location Database's D4c metric)

2. QC Review (Complete a QC review check and identify any opportunities to increase "mixed use" areas that have the potential to help reduce VMT/capita, based on which Place Type ingredient is missing/underrepresented (e.g., housing, employment, activity density, diversity, design)
   a. If the review results in a change that would require significant modifications that are not consistent with the Comprehensive Plan, coordinate with the local jurisdiction.
   b. If the review results in a minor change that is limited to incorporating assumptions of the CFA:
      i. If a change to population or HHs, update Step 2bi (PopSim set up)
      ii. If a change to other TAZ assumptions, update 2biv (Run Place Types)

3. **Other Zonal Inputs**
   a. Parking (spatial distribution, short and long term pricing, restrictions, etc)
   b. Transit Coverage
   c. Intersection Density/Design D (note that this may alter mode and destination)
   d. Employment
   e. Other JEMnR inputs

4. **Network Edits**
   a. Confirm strategies and projects assumed in CFA (This would come from local agency and may include Gap Analysis findings that supplement existing project list)
   b. Transit adjustments (Coordination with transit staff)
      i. Line assumptions
      ii. Service assumptions
   c. Pedestrian and Bicycle improvements [ABM network fidelity]
   d. Connector Placement
   e. Pricing Policy [ABM enables more refined]

5. **Model Run and Off Model Adjustments**
   a. Pre adjustments
      i. Manual/targeted adjustments (e.g. manual adjustments in demand for CFA TAZs)
   b. Post adjustments
      i. Manual/targeted adjustments (e.g. manual adjustment in demand for CFA TAZs)
   c. QA QC Procedures
      i. Review mode split
   d. Iteration Considerations

6. **Model Outputs and Reporting**
   a. VMT/Capita
      i. External Model Trips
         1. Identify external trips and links
         2. SWIM estimation of external trip distance
      ii. I-I trip procedures (within TAZs and between TAZs within the same CFA)
      iii. NHB trip handling
      iv. Reporting Resolution – develop scripts for reporting given JEMnR/ABM output [may vary for ABM]

          1. Jurisdiction level (for TSP)
          2. Region level (for RTP)
          3. (future) Potential for analysis by "sub-jurisdiction" zones for Plan Amendment purposes
    b. Database techniques [ABM]

OTHER FRAMEWORK ELEMENTS AND CONSIDERATIONS

1. **In model assumptions:**
    a. Road Diet/Lane reconfigurations: Assumptions on speeds, bike/ped facilities (coordination with local agency staff)
    b. Future Transit Service estimation (Coordination with transit staff)
        i. Examples: Nick/Corvallis, Tara/STS Monitoring (based on funding and NTD assumptions on %capital and $/mile)
    c. Latent/Induced demand: APM for guidance on best practices, when additional analysis warranted, ie. SWIM run
    d. How to treat group quarters
    e. (Stretch opportunity) Bike/ped in-model improvements. Also off-model ideas below. Consider potential needs for reestimation (and avoid if possible) depending on type of change
        i. Make route quality sensitive using 3-level LTS segment tag & routing (1-2/3+/None). Metro is already using LTS in bike routing but not overall estimation of bike trips
        ii. Assumptions may vary by trip purpose and (with ABM) household
        iii. Improved bike/ped connectors
    f. Future: how to account for commercial (light-vehicle) trips driven by households, e.g., e-commerce delivery (article), where available (trip-based models typically scale up HH trips; CALM & Bend & ABMs have commercial vehicle models)

2. **Potential Off model methods (Note: likely prioritize based on ability to shift modes):**
    a. BikePed: Nick/NCHRP 08-149, CMAQ (ODOT used in STIP), other?
    b. TDM programs (TRIMMS model?)
    c. Telework "potential" – Borrow from VisionEval used in OTP?
    d. Vanpool/Carpool "potential" - create table of existing/forecast City-City home-based trips (SWIM, OHAS, Census source?, all trips or just work?) Get There and TO programs provide base data.
    e. Credit for non-VMT GHG reduction actions (mitigation if not meet VMT/cap requirement), e.g. EV charging, Low/No Transit vehicles/fuels, ITS/congestion speed changes

PROPOSED CASE STUDIES

The project team is using two case studies to develop and refine the procedures that build upon this framework in collaboration with OSMC working group review. The purpose of the CFEC Modeling case studies are to serve as a "sample problem" to 1) use for testing and refining new modeling procedures, and 2) demonstrate technical approaches. The case studies are not intended to make any technical findings specific to the jurisdiction and/or sample location and are not

intended to suggest planned land use or transportation actions. The case studies should include a reasonable range of "actions" (investments, programs, or policies that could be placed into TSPs) that Cities would contemplate as part of their solution to CFEC requirements. The intent of the case studies are to provide a reasonable example that can provide a demonstration for future reference to inform the technical guidance.

Ideally, each case study would be realistic and would have assumptions about the potential climate friendly area (CFA) boundary and uses that are plausible. However, it is understood that this work is very fluid and evolving across all communities and any sample used for a case study application will likely continue to change over the coming year.

The project team discussed potential case study considerations and strategies for selecting case study candidates with the OMSC Working Group. These considerations included:

- Provide relevant knowledge base for other cities:
  - Variation – Identify examples with contrasting location, community size, model type, etc.
  - Metro Location – Consider a Metro location that would have direct similarities with several other cities.
- Provide a realistic example:
  - CFA Boundary - CFA location has been generally identified and prior planning has occurred
  - Approximate land use capacity – Local agency has estimated housing units and employment capacity anticipated based on zoning changes
  - Model readiness – Modeling staff have been engaged in CFA discussions
  - Complexity – avoid locations that are expected to have complex trip interactions with other areas in the community or adjacent areas

Following the meeting, additional input from committee staff and coordination with potential candidate locations occurred. Based on the prior discussion and additional coordination, the following case study locations were selected:

- Milwaukie
  - Trip based model example
  - Community within the Portland Metro region that uses the same Metro model as a number of other communities
  - CFA locations are based on Metro's 2040 Growth Concept (Town Center)
  - City is in early stages of TSP update
- Ashland
  - Within the Southern Oregon activity based model – providing some opportunities beyond the trip based model application.
  - The City has conducted some initial planning efforts to inform potential CFA locations