CREATING A NO-BUILD SCENARIO FROM A BUILD SCENARIO

Atravel demand model typically includes a future scenario year with a modeled transportation network that reflects implementation of a long-range plan (for MPOs a MetropolitanTransportation Plan (MTP)). The MTP is the long-term blueprint for the region's transportation system, typically covering a time span 20+ years into the future.

Projects entering the environmental review phase of project development usually have already been included in the MTP. As such, the project team may need to remove the project and any associated land use effects from the MTP model to create the future no-build scenario.

Additionally, other MTP projects may also have to be removed for both theno-build and build scenarios if the MTP included any projects that are not already funded and committed to be construced before the forecast year. Some MTPs and, therefore, their models, include speculative projects that do not have identified funding commitments and are not reasonably forseeable within the cumulative timeframe for NEPA analysis of an individual project. Current practices and requirements differ by State. For example, California has a strict definition of what is reasonably foreseeable pursuant to the California Environmental Quality Act (CEQA).

Method Description

Creating a future no-build scenario from a future build scenario involves determining whether the project (and any other project that is not committed and funded) and its land use effects are included in the available regional forecast and, if so, removing them.

First, determine whether the forecast includes the project and its land use effects. Review the model network to determine whether the project itself is coded. Consult the model preparers, local planners, and documentation of the land use allocation process to determine if the land use effects of the project are included in the forecast; they usually have been, even if the project was not coded into the travel model. The documentation explains how transportation network changes influence accessibility and how the accessibility changes influence land use allocation.

Also determine if any other projects in the MTP should be removed due to funding uncertainty or other constraints that indicated that they might not be built bythe forecast year.

Developing the no-build scenario varies depending on whether a project is likely to influence land use allocations. Determine whether the projects to be removed might substantially alter land use because of changes to regional accessibility or access to different areas in the region:

1. If evidence conclusively demonstrates that removed projects would not substantially influence future land use growth allocations, delete the project components (and components from any other speculative projects) from the

transportation network. Update the model runs to create the no-build scenario.

2. If evidence exists that the removed projects or their effects have influenced the land use growth allocations used in the model (for population or employment growth), then you will also revise the land use allocations. Each project component removed from the transportation network might warrant changes to the land use allocations.

   After all land use and network changes are complete, then the model represents the no-build scenario.

A few circumstances may warrant a change to the model's growth control totals, especially if a project is significant enough to increase the long-term growth of the region being modeled (rather than simply redistributing the growth). The project would have to significantly improve "connectivity, mobility, accessibility, and reliability of the transportation system" that can "positively influence jobs, wealth, tax base and well-being." (Connecticut ASE, 2013).

Methods such as regional economic simulation model analysis or a research-based approach such as one using the research of Duranton and Turner (2012) can be used to gauge whether the long-term economic impacts of a given project warrant adjustment of growth control totals.

Also examine the model's growth control totals to determine if updates are needed. Collaborative judgement may be used to determine if changes in control totals are warranted for a conservative analysis. In most cases, the model's growth control totals will remain the same, but the growth will occur in different locations due to the removal of the accessibility benefits created by the project.

Modifying the land use is a challenging step in the process. Depending on the approach used to develop land use growth control totals and allocations for the MTP model, different actions are needed:

1. **Scenario 1:** If the MPO has a land use growth allocation model that is sensitive to changes in accessiblity, rerun the model without the project to develop no-build land use inputs.
2. **Scenario 2:** If the MPO has a land use growth allocation model but is not sensitive to changes in accessibility, use Collaborative Judgment to determine whether and how the model land use inputs should be adjusted to reflect removal of the project. If resources allow, modify the land use model to improve its sensitivity.
3. **Scenario 3:** If the MPO model has no land use growth allocation model, use Collaborative Judgment to determine whether and how the model land use inputs should be adjusted. See the Collaborative Judgment summary sheet for more information.

For Scenario 1, no additional guidance is addressed here since presumably the modeling process is sensitive to the project's accessiblity effects and can simply be re-run. Therefore, this method sheet focuses on guidance for addressing scenarios 2 and 3, where the MPO does not have a land use allocation model or the model is not sensitive to changes in accessiblity.

Applicable Context

This method should be applied when a project team has access to one future forecast and wants to modify it to obtain future build and future no-build forecasts.

Prerequisites

1. **A statically validated model** that accurately replicates observed conditions. For more information on static validation, see guidelines you're your State may have issued andFHWA's *Travel Model Validation and Reasonableness Checking Manual*. Many states have used this document as the basis for their requirements for validation. See the Model Responsiveness summary sheet for more information.
2. **Full model documentation and complete set of model files.** Proper application of models requires documentation describing the model's estimation, calibration, and validation plus complete instructions on user applications. The user applications should include details about how to set up the model including hardware and software requirements. Prior to conducting any project related applications, the user should verify that they can identically replicate the agency's model outputs for standard base year and future year runs.

Method Implementation

1. Determine whether the MTP forecast includes the proposed project. MTP project description may not contain sufficient details about individual projects to accurately model them for environmental review purposes. As such, how the project is represented in the model's transportation network is an important consideration. The off-the-shelf MTP model may include the full project, may include only a partial representation of the project, or may exclude the project. The first two scenarios will require modification of the MTP model to create the no-build and possibly the build project scenarios for NEPA review purposes.
2. Remove the project components from the model network and verify whether other projects in the MTP should also be removed due to funding uncertainty or other constraints that could affect implementation by the cumulative year. The no-build cumulative scenario should be limited to those transportation projects that will reasonably be implemented by the cumulative year based on financial resources and the ability to complete the project development process. Determine whether the land use effects of the project (and other MTP projects to be removed) are included in the forecast.

   a. Ask transportation agency representatives and transportation planners about existing land use forecasting and allocation methods. Review all available model documentation, but also consider reviewing the models themselves. For example, does the land use allocation model include any transportation network inputs that are either directly or indirectly influenced by the project's proposed network changes? Do these inputs result in changes to accessibility that influence the land use allocations?

   b. In meetings with the project sponsor and those familiar with existing modeling tools, consider the following issues:

      i. Do the model preparers believe the land use/socioeconomic inputs represent future conditions with or without the project? Do local planners agree? Is this finding consistent throughout the study area?

ii. If the land use/socioeconomic inputs were prepared with a forecasting approach that integrates land use and transportation, carefully determine if the project was included or excluded in the analysis and identify any documentation or evidence supporting the conclusion.

iii. What were the specific steps in the land use forecasting and allocation process, and what inputs were modified related to the project? What evidence exists that the allocation process was sensitive to the type of network changes associated with the project?

iv. Did the transportation network explicitly used in the future year forecasting include or exclude the project?

v. Was the project considered when the forecasts and socioeconomic data inputs to the travel demand model were developed? If so:

1. Do the socioeconomic data inputs substantively represent the Build condition as intended?
2. Was the land use allocation prepared for the model based on local land use plans that anticipated the project's completion or on a land use allocation model that included accessibility analysis that incorporates the project?

vi. How were the forecasts allocated to smaller geographies? Was accessibility a consideration, and if so, how was it applied in the modeling process?

vii. Did any accessibility analysis or attractiveness modeling explicitly include the project? If so, was the analysis or modeling sensitive to the type of network changes associated with the project?

viii. Are there any inconsistencies in how the project was considered, such as a consensus-based allocation in which some jurisdictions assumed the effects of the project and others did not?

3. If the forecast does include the land use effects of the project, modify the land use growth allocation to remove the influence of the project. The specific approach to these modifications will depend on the answers to the questions above, but will largely rely on the use of Collaborative Judgment. See the summary sheets on Collaborative Judgement and Quantitative Methods for Allocating Land Use for additional guidance.

Documentation

Documentation should include summary data, explanatory text, and a complete list of references sufficient to allow an outside party to reproduce the analysis. Explain how the experts addressed the questions posed in this sheet, the sources and data used to inform their deliberations, the reasoning behind their decisions, and the results. Documentation may include:

- How information was collected
- Whether the project and its land use effects were included in the unmodified forecasts
- Discussion of how the project and its effects were or were not accounted for in the unmodified forecasts and the steps taken to adjust the forecasts to remove the project and its effects.
- Whether any speculative projects and associated land use effects were included in the forecasts

- Whether control totals were adjusted
- How land use impacts were adjusted
- Any other steps conducted to adjust the forecasts to remove the project and its effects.

Meeting summaries, technical memos, and memos to file would be appropriate vehicles for documenting the this process.

Project Examples

New Location Toll Road

For a new location toll road in a large and growing metro area, the project team reviewed all of the model documentation and interviewed the MPO staff responsible for the model. The MPO had used both a "top down" study to determine regional and county control totals for the land use forecasts, and a "bottom up" land use allocation model that incorporated the transportation network. The model, which they already had, was a customized land use allocation tool designed to automate the disagreggation of county control totals from the "top down" forecast, and it was developed by a local university.The unanimous opinion of staff was that the land use allocation model included a complete Build network, but that the model was not sensitive to the project therefore, the land use forecast represented a no-build condition.

As this model was available and the study team agreed with the assessment of the MPO staff based on a review of the allocation model results, the team decided to use the model results as the forecasts for the no-build scenario. (They did not need to have a model to do this, but, since they did, they adapted it to a new use.) The team proceeded to develop an alternative build land use forecast using a combination of Collaborative Judgment and simple GIS allocation methods.

If a court case had happened, the presence of the project in the land use allocation modeling would be the focus of legal arguments that the study team compared the build scenario to a build scenario (rather than to a no-build scenario). Because the study team used their judgment instead of a Sensitivity Analysis to prove the project's presence in the land use allocation model had no impact, the court case might be lost on appeal.

The study team could then prepare a supplemental EIS and included sensitivity analysis in which the original land use allocation model was re-run with a no build transportation network. The forecast results in the study area might not change from what they had been with the original transportation network (including the project), but now they have adequate documentation in the SEIS. This approach would be more likely to pass court review.

Completion of Regional Outer Loop Highway

This large-scale project completed a regional outer loop highway in a growing suburban area. The region, which included several MPOs, had an existing travel demand model and land use model, which used the CommunityViz land use allocation software. Using Collaborative Judgment, project planners met with representatives of the MPOs to determine if the moded included the new outer loop sections. Discussions indicated that the model assumed that the loop would be complete by the horizon year and the land use allocation process included the project's effects. The project team selected the existing model to serve as the build scenario.

In order to develop a no-build scenario for analysis, the project team used Collaborative Judgment with local planners to determine how development patterns would differ from the existing model inputs if the road were not built. In general, local planners predicted that growth in the area would continue regardless of whether the road were built but that the growth may occur at different densities and/or in different areas under the two scenarios.

Next, because of the large, regional scale of the project, the model's control totals for county-level socioeconomic data were modified to create the no-build scenario. The project team evaluated and selected a research-based method (based on Duranton and Turner [2012]) to assign a lower growth forecast (fewer housing units and jobs) to the no-build scenario. The method provided lower regional "control totals" for housing units and jobs. The project team then used land use information provided by local planners to adjust the customizable land suitability factors in the regional land use model to reflect the ways in which a no-build scenario would differ from the existing build scenario. The adjusted CommunityViz model produced a no-build land use scenario. This approach enabled a consistent basis for comparisons between the two scenarios.

The reasoning, methodology, model inputs, and results were described in technical memos. The recommendations developed from Collaborative Judgment activities were summarized in meeting summaries and maps. The meeting summaries and maps were validated by the meeting participants and included in the technical memo as an appendix.

Resources

California Air Resources Board. (2014). *Impacts of Gas Price on Passenger Vehicle Use and Greenhouse Gas Emissions.* https://www.arb.ca.gov/cc/sb375/policies/gasprice/gasprice_brief.pdf

California Transportation Commission. (2017). *2017 Regional Transportation Plan Guidelines for Metropolitan Planning Organizations*. http://www.dot.ca.gov/hq/tpp/offices/orip/rtp/docs/2017RTPGuidelinesforMPOs.pdf

Cambridge Systematics, Inc. (2010). *Travel Model Validation and Reasonableness Checking Manual.* Second Edition. Prepared for FHWA. https://connect.ncdot.gov/projects/planning/tpb%20training%20presentations/fhwa%20model%20validation%20handbook.pdf

Connecticut Academy of Science and Engineering. (2013). *Analyzing the Economic Impacts of Transportation Projects*. Prepared for the Connecticut Department of Transportation, Newington, CT.

Duranton, G., and M.A. Turner. (2012). Urban Growth and Transportation. *The Review of Economic Studies, 79*(4):1407-1440.

FHWA. (2008). *Economics: Pricing, Demand, and Economic Efficiency, A Primer*. https://ops.fhwa.dot.gov/publications/fhwahop08041/fhwahop08041.pdf