Addendum to the 2007 Regional Transportation Plan Guidelines

Addressing Climate Change and Greenhouse Gas Emissions During the RTP Process

Adopted by the California Transportation Commission
on May 29, 2008

Climate Change and Greenhouse Gas Emissions

Purpose of this Addendum

In January 2007, Senate President Pro Tempore Don Perata requested that the California Transportation Commission (Commission) use its current statutory authority to review its Regional Transportation Plan (RTP) Guidelines in order to incorporate climate change emission reduction measures. The request also stated that RTPs should utilize models that accurately measure the benefits of land use strategies aimed at reducing vehicle trips.

Commission staff established an RTP Guidelines Work Group to assist in the development of best practices for inclusion in the RTP Guidelines. The work group consisted of over 200 representatives from the Assembly and Senate, Regional Transportation Planning Agencies (RTPA), Metropolitan Planning Organizations (MPO), state and federal agencies/organizations, environmental interest groups, building and industry organizations, and county and city associations.

At the direction of the Commission during their January 10, 2008 Commission meeting, the results of the RTP Guidelines Work Group have been included in this addendum to the RTP Guidelines. The results of the work group reflect a variety of approaches that allow MPOs and RTPAs great leeway in considering the strategy(s) that best fit their needs.

Although none of the information contained within this addendum is identified in current statute, therefore not required by State (or federal) law; MPOs and RTPAs are strongly encouraged to adhere to the guidance contained in this addendum. Questions regarding the policies within this addendum should be directed to:

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The guidance contained within this addendum should be viewed in the overall context of the 2007 RTP Guidelines document adopted by the Commission September 2007.

Federal and State Clean Air Actions

The federal government currently does not have formal air quality regulations to address climate change. The issue has been politically contentious at the federal level. The United States Environmental Protection Agency is preparing draft language to include greenhouse gases in the Clean Air Act, however it is unknown when this draft language would be released.

The political leadership in California has been quite active in addressing climate change issues. Greenhouse gases (GHG) have been identified as specific air pollutants that are responsible for global warming and climate change. California has focused on five GHGs (Carbon Dioxide, Methane, Nitrous Oxide, Hydro fluorocarbons, and Sulfur Hexafluoride). Carbon Dioxide (CO_2) is the most prevalent GHG. All other GHGs are referenced in terms of a CO_2 equivalent. The California Environmental Protection Agency (CalEPA) prepared a briefing package for Assembly Bill (AB) 1493 entitled "Global Warming and Greenhouse Emissions from Motor Vehicles"; page 14 of this document stated that, "Transportation is California's largest source of Carbon Dioxide."

Governor Schwarzenegger has issued two Executive Orders regarding this issue: S-3-05 (June 1, 2005) that calls for a coordinated approach to address the detrimental air quality effects of GHGs and S-20-06 (October 18, 2006) that requires State agencies to continue their cooperation to reduce GHG and to have the Climate Action Team develop a plan by June 1, 2008, to outline a number of actions to reduce GHG. Information on California climate change activities can be found at:

http://www.climatechange.ca.gov/index.html

California Greenhouse Gas Emission Legislation

- One of the most important legislative actions to address GHG was AB 32 (Nunez, 2005) known as the California Global Warming Solutions Act of 2006. AB 32 required the California Air Resources Board (ARB) to set statewide GHG emission reduction targets by adding Health and Safety Code Division 25.5, Section 38500 et seq.
- Under California's Clean Air Act (Section 39000 et seq California Health and Safety Code) the ARB sets and updates air quality standards.
- Senate Bill (SB) 1771 (Sher, 2000) amended Health and Safety Code Section 42800 and Public Resources Code Section 25730 to require consultation with Caltrans regarding the recording and promotion of voluntary GHG emissions reductions through the California Climate Action Registry.
- AB 1493 (Pavely, 2002) added Sections 42823 and 43018.5 to the Health and Safety Code. These sections required the ARB to develop regulations designed to reduce GHGs emitted by passenger vehicles.
- AB 1007 (Pavely, 2005) added Health and Safety Code Sections 43865-43867 that mandated the California Energy Commission in partnership with relevant state agencies to develop a plan to evaluate the environmental and health impacts of alternative fuel use including vehicle operations. Since 2000, the Legislature has approved several bills to ensure the reduction of GHG emissions from mobile sources.
- SB 97(Dutton, 2007) charged the Governor's Office of Planning and Research (OPR) with the responsibility for preparing guidelines to mitigate GHG emissions identified through the California Environmental Quality Act (CEQA) document review process including the effects associated with transportation or energy consumption. Every RTP is subject to CEQA.

SMART GROWTH/LAND USE

RTP Policy Element

1. Develop investments and programs that support local jurisdictions that make land use decisions that implement regional blueprints and other smart growth strategies, including rural sustainability strategies.

2. Emphasize transportation investments in areas where desired land uses as indicated in a city or county general plan may result in vehicle miles traveled (VMT) reduction or other lower impact use.

Transportation Planning and Investment Strategies

1. Consider shifting transportation investments towards improving and expanding urban and suburban core transit, programs for walkability, bicycling and other alternative modes, transit access, housing near transit, and local blueprint plans that coincide with the regional blueprint.

2. Provide funds and technical assistance to local agencies to develop and implement blueprint strategies.

3. Implement operational efficiencies that reduce congestion in vehicle throughput on roadways or improve transit access or other alternative access without physical expansion of the roadways.

4. For the purposes of allocating transportation investments, recognize the rural contribution towards GHG reduction for counties that have policies that support development within their cities, and protect agricultural and resource lands. Consideration should be given to jurisdictions that contribute towards these goals for projects that reduce GHG or are GHG neutral, such as safety, rehabilitation, connectivity and for alternative modes.

5. In setting priorities, consider transportation projects that increase connectivity or provide other means to reduce VMT.

Pricing Strategies

1. Consider the use of alternative mode programs, congestion pricing, toll roads, and parking strategies. Examples include, but are not limited to the following:

   i. Road pricing and High Occupancy Toll (HOT) lanes. To reduce VMT, MPOs should model adding pricing to existing lanes, not just as a means for additional expansion. Variable/congestion pricing should be considered.
   ii. User fees such as fuel taxes and parking charges.
   iii. Free or reduced fare transit fares.
   iv. Expansion of Parking Cash-Out Programs
   v. Strategies to reduce the impacts of pricing strategies on low-income individuals.

2. Consider utilizing revenues from these pricing strategies for projects, such as mass transit, that improve mobility without increasing VMT or GHG emissions.

Road pricing strategies examples can be found at:

"Opportunities to Improve Air Quality through Transportation Pricing Programs", U.S. Environmental Protection Agency, September 1997.
http://www.epa.gov/oms/market/pricing.pdf

"Sacramento Transportation & Air Quality Collaborative Final Report, Volume III: Supplemental Text for Agreements", December 2005.
http://www.sacta.org/pdf/STAQC/FinalReportIII.pdf

Land Use Strategies

Regional land use projections that underlie RTPs have typically assumed existing growth trends will continue into the future, based on general plans. Over the last five years several MPOs have undertaken regional visioning or "blueprint" processes to look at how regions can grow more efficiently and meet more environmental and social goals.

1. Encourage twenty-year or longer regional housing forecasts by region, consistent with the RTP; housing need allocations that are consistent with the blueprint, and general plans to project twenty years forward in conjunction with the blueprint.

2. Encourage that the county or city general plan considers the blueprint plan for the region and links the general plan to reflect the best-case scenario.

3. Encourage that there is a reasonable basis for the projected land uses included in the RTP.

4. Encourage that land use changes contained within city and county general plans are built into land use pattern projections in the base case for modeling purposes.

5. Encourage that where there is a blueprint, the planned land use base for the regional transportation plan is consistent with that regional agency's blueprint.

6. Encourage that the land use base for the blueprint is consistent with federal regulations and current or projected local general plans.

7. MPOs should perform land use sensitivity analyses to determine whether more compact and efficient growth patterns (than the base case) would further reduce VMT.

Performance Measures

1. Include a VMT measurement as part of the environmental reporting requirements, taking into account growth projections for the area.

2. Compare projected blueprint development to actual development in applicable locations and provide an explanation for variances as updated.

3. Report the progress relative to whether the project(s) identified in the local RTP are consistent with city and county general plans or the blueprint strategy for the region.

TRANSPORTATION MODELING

The goal of applying transportation models and analytical techniques, as part of the RTP process, is to enhance the quality of information and analysis presented to educate public decision makers and the public at large regarding the implications of various policy options, while recognizing that the final decisions on policy choices are their responsibility.

1. For preparation of the RTP required under Sections 65080 et seq. of the Government Code, by July 1, 2008, each MPO or RTPA over 200,000 in population is urged to establish transportation modeling and analytical techniques that facilitate its evaluation of one or more alternative planning scenarios under the provisions of Section 65080.3.
2. As part of the four-year RTP process each MPO or RTPA should strive to enhance, to the extent that data and resources permit, its modeling and analytical techniques in order to improve its assessment of the likely implications of key policy options. Such improvements should educate decision-makers and the public regarding how such options would potentially affect trip making, choice of travel modes, VMT, major land use development decisions, housing affordability, and quality of life issues.

3. The transport sector produces almost half of GHG in California. AB375 requires certain MPOs to reduce GHG emissions from light-duty vehicles by certain dates. To evaluate the effectiveness of policies to reduce GHG, the ARB and others need to compare modeling outputs across all regions in the State. To be able to compare travel projections across regions in California, some basic recommended modeling protocols should be adopted. These should be specific to groups of regions, according to policy problems encountered. California Department of Transportation (Caltrans) District Offices, cities, and counties should follow the same practices as used by the MPOs, RTPAs, Congestion Management Agencies (CMA) and Councils of Government (COG).

MPOs, RTPAs, CMAs, and COGs may be grouped according to modeling needs. For each group, we define: Model features and data, possible applications of the model, and policy analysis capabilities. **These recommendations are cumulative, with each set of model guidelines including the earlier ones on the list.**

A. Counties with very slow growth in population and jobs, little or no congestion, and no significant new road or transit construction plans (i.e., Modoc, Inyo, Siskiyou, which have 1990-2000 population growth rates below 3%)

Features and data: These counties do not need to run a network travel model.

Possible applications of the model: No model.

Policy analysis capabilities: Road congestion is not increasing rapidly. Emission changes from higher-MPG vehicles can be factored or derived from the ARB inventory.

B. Regions with attainment Air Quality (AQ), slow growth, or virtually no transit, plus the rural, isolated non-attainment areas.

Features and data: These RTPAs and CMAs can run 3-step models, at least for the next few years. These models should be run to equilibrium. They should implement 4-Ds add-on models by 1/1/2011, to account for the effects of land use characteristics on travel, in the short term. See the recent *Assessment of Local Models and Tools For Analyzing Smart-Growth Strategies* Final Report developed by DKS Associates for Caltrans, which can be found at:

http://www.dot.ca.gov/hq/research/researchreports/reports/2007/local model tools.pdf

The travel model should be documented, including all statistical goodness-of-fit measures derived from sub-model specification. The model should also be put through sensitivity tests and other validation tests, with these tests documented, and then formally peer-reviewed, also resulting in a written report. The models should address changes in regional demographic patterns. Geographic Information Systems (GIS) capabilities should be developed in these counties, leading to simple land use models in a few years. All natural resources data should be entered into the GIS. Parcel data should be developed within a few years and an existing land use data layer created.

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Comment [CT1]: Comments from 7/28 meeting are:

1. Define state of the art
2. Must demonstrate all "add-ons" to models are sensitive to change

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Comment [CT2]: Can a schedule be mandated without funding in place to execute?

Comment [RM3]: How to address limited sensitivity to congestion in travel demand models? This hasn't been a major focus for the traditional use of models but becomes much more important when comparing VMT results across alternatives. This is largely due to fixed trip generation rates in most models.

What is level of static and dynamic validation should be required for MPO models? Current MPO models lack rigorous validation so we often don't know how accurate or sensitive they are.

Possible applications of the model: Agencies can define and evaluate trend forecast, combined general plans, preferred RTP, and low-VMT scenarios. The low-VMT scenario should achieve the regional VMT and GHG targets for light-duty vehicles, if they are adopted by the ARB. Otherwise, the low-VMT scenario can simply reduce VMT substantially and increasingly over time, compared to the proposed RTP.

Policy analysis capabilities: These models can be used to evaluate increased density and mix, urban growth limits, and improved neighborhood walkability and bikeability. Performance measures can include VMT, on-road emissions of pollutants, and GHG, all by vehicle class. Performance measures should also include households and employees by density, land use mix, walkability of travel model zones, and other land use measures.

C. Regions with rapid growth, nonattainment AQ, or the potential for significant transit use.

Features and data: These regions should develop 4-step travel models by 1/1/2011. In the near-term, 4-Ds add-on models should be used. Simple land use models should be used, such as GIS rule-based ones, by 1/1/2011. Economic, market-based land use models should be developed within a few years. A simple freight model should be used. Several employment types should be used, along with several trip purposes. Time periods should include peak and off-peak. The travel model set should be run to full equilibration across all model steps. All road capacities and speeds should be validated with surveys. The urban development footprint in GIS should be used to calculate environmental impacts on terrestrial and aquatic ecosystems. The travel model and land use model should be documented and tested, as above. Parcel data and an existing urban layer should be developed as soon as is possible. A digital general plan layer also needs to be developed in the short-term.

Possible applications of the model: More policy scenarios can be run. The same policies as in *B* could be run, plus one or more transit improvement proposals, as well as demand management and pricing strategies.

Policy analysis capabilities: In addition to the policies and performance measures in *B*, these agencies can evaluate policies for their effects on lower-income households, as required by Federal and State law. This can be done by evaluating traveler welfare measures based on the mode choice log sums for each household income class, or based on travel costs for them. In addition, these agencies can evaluate simple road pricing, parking charges, and higher fuel taxes or carbon taxes in the plan, or in the Government Code Section 65080.3 alternative.

D. Regions with serious or worse ozone or CO non-attainment.

Features and data: These agencies should achieve the requirements of the Federal AQ Conformity Rule, meaning 4-step models with full feedback across travel model steps and some sort of land use modeling, by 1/1/2010. In addition to the conformity requirements, they should also add an auto ownership step and make this step and the mode choice equations for transit and walk and bike and the trip generation step sensitive to land use variables and transit accessibility, by 1/1/2011. Walk and bike modes should be explicitly represented. They should

Comment [RM4]: Should guidance be provided about how to estimate VMT (i.e., VMT per household is a ratio where as VMT generated per household is a rate)?

Comment [CT5]: Performance measures need to be clearly defined as to how they will be objectively measured. Unsure if VMT and on-road emissions of pollutants are worth quantifying as a performance measure in light of providing a GhG emissions performance measure. (VMT is a proxy for GhG and breaking GhG by vehicle class and on-road emissions is above and beyond the requirements of SB 375.

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implement simple land use models for the next RTP and develop formal, economic land use models in the next few years. Freight models should be implemented in the short term and commodity flows models within a few years. Simple Environmental Justice analyses should be done using travel costs or mode choice log sums, as in *C.* Four or five time periods should be modeled. Agencies should develop and test joint mode-destination choice models. Small Traffic Analysis Zones (TAZ) should be used, to increase sensitivity to densification near to rail stations and in Bus Rapid Transit (BRT) corridors. These regions should monitor the large RTPAs and MPOs, in *E* below, as they develop tour-based travel models and activity-based travel models. The next household travel survey should include activities and tours. Floor space rent data should be collected. Parking quantity and cost should be represented in the travel model. The carpool mode should be included, along with access-to-transit sub modes. Speed post-processing should be used and take into account the effects of corridor capacity continuity and bottlenecks on congested speeds and emissions.

Possible applications of the model: Five-step models permit the agencies to design and evaluate more land use policies, such as in *D*, plus complex combinations of transit, land use, and pricing policies.

Policy analysis capabilities: A full range in performance and impact measures could be developed, for economic, environmental, and equity effects, as required by SAFETEA-LU, National Environmental Policy Act, CEQA, and other laws. Traveler welfare could be measured and, if possible, locator welfare. Various measures of economic development could also be created, such as wages, jobs, production, and exports.

E. The largest four MPOs and other COGs and RTPAs with rapid growth and established transit systems.

Features and data: These regions should develop tour-based travel models by 1/1/2011, and activity-based travel models by 1/1/2012. They should also build formal microeconomic land use models, by 1/1/2012, so that they can be used to evaluate economic welfare (utility) and economic development (wages, jobs, exports). Commodity flows models should be developed, with truck and van tours, in a few years. The next household travel survey should include activities and tours. Geocoded employment data with occupational code should be purchased for two or more past years. Floor space quantity and rent data should be gathered. Freight data also should be collected. Full sample enumeration of households in the travel model and land use model should be studied and implemented in a few years, if feasible. Households should be geocoded to location. Stated preference surveys of households and firms should be performed, as necessary, for use in location choice models. Microsimulation of households and firms should be investigated and developed, if feasible.

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Possible applications of the model: The effects of transportation policies and land use policies interact with feedbacks in an integrated model set and so projections will be more accurate. With a market-based land use model, the agency can evaluate land-pricing policies, such as infill subsidies.

Policy analysis capabilities: Economic measures from the land use model could be implemented. These measures are more complete than those from the travel model and include locator welfare, wages, and exports. Equity analysis could

include change in welfare by household income class. Water quality, housing affordability, and fire hazard analysis are examples of the measures that such model sets can also produce. These microsimulation land use models can evaluate the energy use and GHGs produced by households and workers in building space. Economic development impacts may be comprehensively evaluated with this model set. Time-of-day road tolls can be evaluated.

The following recommendations for quality control through model consistency and peer review are essential in creating confidence in modeling results. These process recommendations should be implemented by modeling groups B, C, D, and E, by 1/1/2011.

Modeling Performance Measures

1. For the purpose of meeting the goals of SB 375, modeling performance measures should cover one or more of the following: VMT, VHT, greenhouse gas emissions and fuel usage/consumption.

2. Any transportation model must be consistent with the Regional Transportation Plan, Sustainable Communities Strategy and Alternative Planning Strategy for the region that is being modeled.

Consistency of RTP Modeling

For modeling groups *C*, *D*, and *E*, the No Action alternative and the Proposed Plan alternative in an RTP should be modeled consistently. This means both should be done using the same land use model and the same travel model. The inputs for the models, including alternative land use policies; will be different, of course. This practice will reduce the arbitrariness of zonal projections for households and employment in travel models. This practice also should apply to Environmental Impact Reports (EIR)/Environmental Impact Statements (EIS) studies. The same land use model used in the RTP modeling should be used in the impact assessment for the No Action alternative, the Proposed Plan alternative, and the Environmentally Preferable Alternative. Only in this way, will all of the outputs in the RTP and EIR be comparable. An alternative-planning scenario under Government Code Section 65080.3 should also be evaluated with the same models. Studies performed by cities, counties, and Caltrans districts may use more-detailed networks and zones than the MPO uses, but the models should be otherwise consistent, structurally and in operation, with the MPO model.

Methodologies/Assumptions in Model Development

<<SECTION NEEDS TO BE WRITTEN>>

Peer Review and Model Testing

All travel and land use models should be fully documented, with the documents on the web. They should also be validated and tested for sensitivity to changes in inputs, parameter values, and policies. Elasticities for several variables should be calculated and compared to theory and other models. Validation over time with forecasts or backcasts should be performed, for 10 years or more. When enough odometer data become available, modelled VMT should be calibrated to counted VMT for light-duty vehicles and other vehicle classes. Agencies should have an on-going model improvement program to increase model accuracy and policy sensitivity. Cities, counties, COGs, MPOs, and Caltrans districts should establish on-going data development programs. All substantial model changes should be subjected to peer review and written up. The four largest MPOs should use the Travel Model

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Comment [CT6]: Comments from 7/28 meeting are:

1.Outline state of practice now and where we may head in the future.
2. Should move Bob Johnston's changes from page 6 to here?
3. Add some language about induced demand?
4. Add some language about light duty vs. total fleet and related household trips?
5. Add language about VMT generated per household?

Comment [CT7]: Comments from 7/28 meeting are:

1.Add text to this section regarding CARB role/expectations
2. Summarize codes and policies from SB 375 in this section?

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Comment [CT8]: Comments from 7/28 meeting are to reword or remove this sentence.

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Comment [CT9]: Comments from 7/28 meeting are:

1.Two types: 1) model level, 2) planning level. We will address model level only.
2. Fuel prices, land use, etc.
3. Explain that assumptions can be different but methodology must be consistent
4. Must provide documentation of decisions made

Comment [BY10]: Local agencies have asked SBCAG for certification for consistency as part of the Peer Review Process. Yet there is no clear guidance in the RTP Guidelines on this issue. Now is the opportunity to ensure that a formal process is in place in the RTP to ensure regional/local model consistency.

Comment [CT11]: Comments from 7/28 meeting are:

1.Pass static validation test
2.Pass dynamic validation test
3.How do peer reviews occur, who does it, how do you score model, how do you incorporate improvements suggested from peer review?
4.Document validation of model ... [1]

Comment [CT12]: Unsure on necessity of this statement given the overall methodology of modeling best practices.

Improvement Program (TMIP) national peer review process, but include two California modelers, for their understanding of California laws. Other agencies should set up reviews using California modelers. The California Inter-Agency (CIA) Forum or other body of California modelers may develop validation guidelines. Also, these bodies could develop guidelines for which types of VMT should be reduced in GHG-reduction scenarios and alternatives.

Sketch Modeling of Scenarios

Modeling groups B, C, D, and E may wish to develop fast turnaround sketch modeling tools for testing scenarios in public workshops. Such models include UPlan, iPlaces, and other similar GIS-based software. These models allow the rapid input of land uses and produce rough estimates of changes in VMT and mode shares for the area being analyzed. After a range of scenarios capable of reducing GHG to various degrees is identified from these exercises, the final set of scenarios is evaluated with the official travel model and land use model, to get accurate and detailed performance measures. The best scenarios may then be included in the RTP/SCS and APS processes.

4. The RTP analyses should provide to decision-makers and the public:

   a. A clear explanation of the modeling and analytical techniques applied in assessing the implications of the "likely" land use scenario, and any land use and other alternatives studied;

   b. Reasonable transparency to that modeling and analytical process;

   c. An understanding of the sensitivity of the forecast results to various policy assumptions; for example, where feasible offering estimates of the elasticities and cross elasticities of demand for various modes of travel with respect to critical variables such as access time, travel time, reliability, safety, privacy, and cost;

   d. The degree to which analytical results can be expected to:

      i. Be more indicative of a general expected trend or order of magnitude change rather than a quantifiably valid forecast;

      ii. Provide the degree of certainty needed for the quantifiable forecasts; and

   e. Any insights gained through market-based research into the variables that most influence consumer choices with respect to housing in transit oriented and mixed-use developments, the use of transit services, walking and bicycling as travel modes, and decision to use single occupant vehicles.

5. Interregional Travel and Modeling

Interregional travel, within the context of SB 375, is defined as the sum of the following:

1. Trips beginning outside a given MPO's boundary and ending within it (X-I trip)
2. Trips beginning inside a given MPO's boundary and ending outside it (I-X trip)
3. Trips beginning outside a given MPO's boundary, traveling across some portion of the region and ending outside the boundary (X-X trip)

Comment [RM13]: How should AQ conformity guidelines for model validation be used with respect to VMT? Current guidelines state that HPMS is the primary estimate for VMT. However, this is just another model that has not been established as superior to three or four step travel demand models. For small to medium sized MPOs, we often question the accuracy of HPMS estimates due to the limited data used in their VMT estimates.

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Comment [CT14]: This section may be outside the authority and intent of the addendum/SB375?

Comment [CT15]: Comments from 7/28 meeting are:

1. Do we identify that model can't necessarily answer every question?

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The Statewide Travel Demand Model will provide interregional trip data to be used in MPO regional models. In those instances where adjacent MPO models produce dissimilar interregional volumes, the Statewide Travel Demand Model will act as the controlling source of data which the MPO regional models must reasonably match. The Department of Transportation will act as arbiter in these situations to help reach consensus.

Comment [CT16]: Comments from 7/28 meeting are:

1.How do we define interregional travel?
2.STDM will be arbitrator of interregional issues
3. Incorporate RTAC decision?
4. Sensitivity of models that affect interregional trips.

The following are suggested references:

"Assessment of Integrated Transportation/ Land Use Models", Robert Johnston and Mike McCoy, UC Davis for Caltrans, May 2006.
http://www.ice.ucdavis.edu/um/

"Assessment of Local Models and Tools for Analyzing Smart-Growth Strategies," DKS Associates, with UC Irvine and UC Santa Barbara, for Caltrans, July 2007.
http://www.dot.ca.gov/hq/research/researchreports/reports/2007/local model tools.pdf

"Traveler Response to Transportation System Changes, Interim Handbook," TCRP Web Document 12 (Project B-12), March 2000.

"Metropolitan Travel Forecasting: Current Practice and Future Direction" Transportation Research Board, Special Report 288.

Robert A. Johnston, "Review of U.S. and European Regional Modeling Studies of Policies Intended to Reduce Transportation Greenhouse Gas Emissions" July 30, 2007. On the VTPI web site and available from the author at UC Davis.

Page 8: [1] Comment [CT11] **Caltrans TSI** **7/30/2009 11:42:00 AM**

Comments from 7/28 meeting are:

1. Pass static validation test
2. Pass dynamic validation test
3. How do peer reviews occur, who does it, how do you score model, how do you incorporate improvements suggested from peer review?
4. Document validation of model
5. Document existing FHWA policies/TMIP
6. What is a realistic level of effort?
7. How will the additional costs of peer reviews be addressed?