

Memorandum

TO: Caltrans 2040 STP Team

FROM: Ron West and Michelle Bina

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RE: Recommendations and Analytics Framework for CTP 2040 Strategies

Draft for Discussion

Introduction

This memo addresses two areas related to greenhouse gas (GHG) emissions reduction strategies – recommendations for transportation strategies, and the analytic framework used to evaluate each strategy. Individual and related groups of strategies are being evaluated with the purpose of ultimately packaging a preferred set of strategies for the CTP Alternatives.

The analytic framework describes how each strategy is evaluated. Some strategies will be forecasted using the new California Statewide Travel Demand Model (CSTDm), while other strategies will be evaluated using off-model strategies or from literature reviews. In all cases, strategies will be summarized by their contributions to reducing vehicle miles of travel (VMT), which in turn will be used to forecast greenhouse gas (GHG) reductions.

Analytic Framework

Before discussing each strategy under consideration for the four categories, the underlying analytic framework is first described here. The analytic framework has been developed as a two-by-two matrix – whether to use the California Statewide Travel Demand Model (CSTDm) or to use off-model (or other) techniques, and whether each strategy represents a specific policy/program or if the strategy is an aspirational objective. Each strategy will be evaluated under this analytic framework, as shown in figure 1.

Figure 1: Proposed Analytic Framework Matrix

| Analysis Tool: | CTP 2040 Strategies | |
|--------------------------------|----------------------------|------------------------|
| | Specific Policy or Program | Aspirational Objective |
| CSTDM | | |
| Off-Model (or other technique) | | |

The rationale behind this analytic framework is to organize strategies in a coherent manner so methodologies, input assumptions and forecasted transportation benefits can be understood by interested CTP 2040 observers. For example, a road user charge (RUC) represents a specific policy to be evaluated using the CSTDM. GHG reductions associated with increased road user charges can be traced and documented to the CSTDM system.

On the other hand, a strategy of doubling the share of telecommuters is an aspirational objective (and not based on a specific policy or program). Increasing telecommute shares can be accomplished in myriad ways; however, the intent of this strategy is to inform about the GHG effects of increased telecommuting.

The difference between these two examples is that the transportation and GHG impacts are assessed for a specific RUC (or a range of RUCs), while increased telecommuting is presented given a pre-supposed outcome. Eventually, specific policies to support greatly increased levels of telecommuting may be developed to meet the aspirational objectives. Thus, the outcomes of the aspirational objectives may ultimately bolster advocacy and implementation of increased telecommuting. At the very least, CTP 2040 readers will be informed on the underlying assumptions for each of the strategies.

Transportation Improvement Strategies

Transportation improvement strategies have been packaged into four broad categories. Two accompanying workbooks describe the strategies in more detail, and array each of the strategies into the analytic framework matrix. Strategy categories include:

- Pricing;
- Transportation Alternatives;
- Mode Shift; and
- Operational Efficiencies.

Pricing strategies have included road user charges (RUC), gas tax increases and congestion pricing. Each of these measures is intended to increase the cost of driving, which is expected to reduce driving and GHG emissions.

A RUC as considered for CTP 2040 would increase auto operating costs on all roadway facilities during all times of the day. A gas tax would have much the same effect as the RUC, but would be specifically imposed on sales of gasoline (and potentially other fuels). Congestion pricing would assess tolls on specific high-volume roadways during the most traveled times of the day.

The RUC recommended for assessment in CTP 2040 for a number of reasons. A RUC and gas tax are somewhat interchangeable, and would be assessed for all travelers within the CSTDM. Congestion pricing, on the other hand, would be time consuming to apply and analyze. Additionally, CSTDM is not equipped to forecast variable congestion pricing, so the application of congestion pricing is limited to the model time periods.

Presently, different levels of RUC implementation are being evaluated. Previously, a RUC that doubled the Year 2010 auto operating costs resulted in a 24 percent decrease in statewide vehicle miles of travel (VMT).

Transportation alternatives consist of aspirational strategies to reduce driving. Included in this category are increased telecommuting, increased carpooling, and increased car sharing. ARB and CAPCOA have documented VMT and GHG reductions associated with implementation of these strategies. Specific aspirational improvements are still being researched, so recommendations are not yet available.

Mode shift strategies include various improvements to facilitate transit, bicycling, walking, and carpooling. Transit improvements will be evaluated as a sensitivity test that includes aggressive improvements to public transportation in California. This sensitivity test will reduce all transit route headways in half, double transit speeds, have free fares, reduce transit transfer times and convert a percentage of local bus routes to bus rapid transit (BRT). In addition, 2040 high-speed rail fares will be assumed to be reduced or free. Some specific elements, such as the level of BRT conversions are still under review.

For the most part, the transit improvement assumptions will be tested using CSTDM. The conversions/upgrades of local buses to BRT will be assessed using ridership improvement factors published in the TRB publication, *BRT Practitioners Guide* (TCRP 118).

Bicycle and pedestrian improvements will be evaluated off-model. Proposed improvements to pedestrian infrastructure will be compared against the ARB White Paper on pedestrian strategies¹ to determine changes to VMT. An additional test will assume doubled mode shares in 2040 beyond that shown in the CSTDM baseline alternative (Same as CTP 2040 Alternative 1 – Planned). The change in bicycle and pedestrian mode shares will be converted into VMT and GHG savings.

Carpool changes include changing the minimum statewide HOV occupancy from 2+ to 3+. We are not sure of the effects to VMT and GHG of this change beyond improving HOV levels-of-service. This specific strategy will be tested and presented to Caltrans staff.

¹ Sciara and Handy, California Air Resources Board, Policy Brief on the Impacts of Pedestrian Strategies Based on a Review of the Empirical Literature, December 3, 2013.

An additional strategy will expand the HOV network statewide, focusing on connecting HOV facilities between regions. The specific network improvement locations are not yet finalized.

Operational Efficiencies include improved response times to incidents and emergency management, Caltrans TMS Master Plan, intelligent transportation system elements, and eco-driving. Each of these strategies will be evaluated off-model. ARB and SACOG have published information on GHG reductions and reduced fuel consumption (for eco-driving). Specific recommendations for each of these strategies is still under review.

Next Steps

Over the next few months, model runs and off-model evaluations will be made for each of these strategies, including some cases where different levels of implementation will be assessed. Presentations to upcoming CTP 2040 PAC and TAC meetings will be made the present outcomes from evaluations of the strategies with a focus on development of a final set of strategies to be included in CTP 2040 Scenario 2 (Planned plus Future CTP Strategies).

CTP 2040 Strategies Matrix - Summary of Strategies Developed by MPOs and ARB, with Recommendations for Initial Testing

| | Unit of Measure: | Range of values | | VMT Reduction (estimated) | | Comments | Recommendations |
|--|---------------------------------------|--|----------------|---------------------------|------|--|---|
| | | Lo | Hi | Lo | Hi | | |
| Pricing | | | | | | | |
| Road User Charge (RUC) | Reduced VMT | \$ 0.01 | \$ 0.08 | -1% | -9% | MPO RUCs raised auto operating costs by 5 to 30% | Combine RUC, gas tax and congestion pricing into a single fee - called RUC. Test different levels of RUCs. Doubling RUC in 2010 resulted in a statewide reduction of VMT by 24%. Next steps: Test 2040 RUC with additional strategies. Status: In Progress |
| Gas Tax | Per Gallon | \$ 0.10 | \$ 0.15 | | | Gas tax increase proposals would have a negligible impact. Each 40 cent increase amounts to ~5% increase in auto operating costs. | |
| | Reduced VMT | < \$ 0.01 | < \$ 0.01 | < 1% | < 1% | | |
| Congestion Pricing | Reduced VMT | \$ 0.10 | \$ 0.25 | -11% | -27% | Congestion pricing would have a more significant impact on auto operating costs. Question is to <i>extent</i> (All roads? Only congested facilities?) and <i>time</i> (what parts of the day?) these charges are assessed. Direct modeling could be complicated and time consuming to implement. | |
| Transportation Alternatives | | | | | | | |
| Telecommute | Multiple measures cited. | | | TBD | TBD | | Additional investigation needed.. Off-model analysis likely to be used. |
| Carpoolers | Increased number of carpoolers | | | TBD | TBD | | Additional investigation needed.. Off-model analysis likely to be used. |
| Car Sharing | Multiple measures cited. | | | TBD | TBD | | Additional analysis needed. Will work up assumptions on car sharing penetration. |
| Mode Shift | | | | | | | |
| Expand/Enhance Transit/Passenger Rail | Headways and transit travel times. | 2x transit service; 2x transit speeds | | < 1% | 2.5% | | Test doubling statewide transit service, and doubling transit speeds as part of larger transit improvement scenario.. |
| Transit Fares | Transit fares. | Free fares | | TBD | TBD | Source of VMT percentage reductions: CAPCOA; High value seems not reasonable. | Test free transit option. |
| Bus Rapid Transit | Conversion of Local Bus Routes to BRT | TBD | | TBD | TBD | Increased ridership from BRT Handbook. Will be converted to mode share change and then to VMT change | Can be modeled off-model with assumptions on percent of services converted to BRT. |
| Timed Transit Transfers | Transfer times | TBD | | TBD | TBD | | Test timed transit transfer option as part of larger transit improvement scenario. |
| High Speed Rail | HSR fares | TBD | Free HSR fares | TBD | TBD | | Included as a package of proposed transit improvements |
| Expand Bike | Increased bicycle mode shares | % Increase in bike infrastructure | | TBD | TBD | ARB provides some guidance on increase bike shares due to miles of on-street bike lanes; | Likely to be evaluated off-model. Although mode choice mods + traffic assignments could be conducted. |
| Expand Pedestrian | Increased pedestrian shares | % Increase in sidewalk improvements. | | TBD | TBD | ARB provides some guidance on increase ped shares due to improved sidewalk characteristics; | Likely to be evaluated off-model. Although mode choice mods + traffic assignments could be conducted. |
| Carpool Lane Requirements | Increased HOV occupancy requirements | Change 2+ occupancy to 3+ | | TBD | TBD | Impact of this change is not known. Will be tested to assess impacts | Increasing 2+ carpool requirements to 3+ will be tested. |
| HOV/HOT Lanes | Change to VMT | Added HOV lanes, especially interregional connectors; and in-fill missing gaps | | TBD | TBD | Impact of this change is not known. Will be tested to assess impacts | To be modeled with CSTDM; ID of proposed locations is needed. |
| Operational Efficiency | | | | | | | |
| Incident/Emergency Management | Reduced VMT, GHG | | | TBD | TBD | 1.0% reduction in GHG - SACOG. | Off-model application |
| Caltrans' (TMS) Master Plan | Reduced VMT, GHG | | | TBD | TBD | 1.2% reduction in GHG - ARB | Off-model application |
| Intelligent Transportation System Elements | Reduced VMT, GHG | | | TBD | TBD | < 1.0% Reduction in GHG - SACOG | Off-model application |
| Eco-driving | Reduced fuel consumption | | | TBD | TBD | 2.7% reduction in fuel consumption - ARB | Off-model application |

Analysis Framework for Evaluating CTP Strategies

| | Policies | Goals |
|---|--|---|
| <p>California Statewide Travel Demand Model</p> | <ul style="list-style-type: none"> • Road User Charges / Gas tax / Congestion pricing • Transit improvements More service, faster service, reduced/free fares, timed transfers, reduced/free high-speed rail fares • Increase car pool lane requirements • Additional HOV/HOT lanes (focus on interregional connections) | |
| <p>Off-Model</p> | <ul style="list-style-type: none"> • Expanded bus rapid transit • Expanded pedestrian infrastructure • Expanded bicycle infrastructure • Incident/Emergency management • Caltrans TMS Master Plan • ITS elements | <ul style="list-style-type: none"> • Increased telecommuting • Increased carpooling • Increased car sharing • Eco Driving |

Color Key: Pricing, Transportation Alternatives, Mode Shift, Operational Efficiency