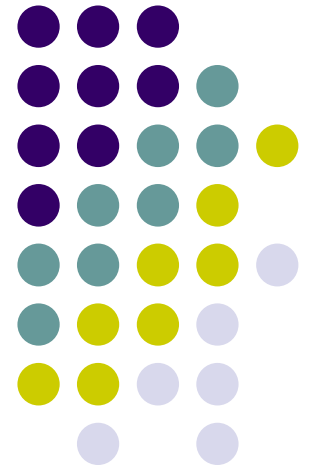


SANDAG

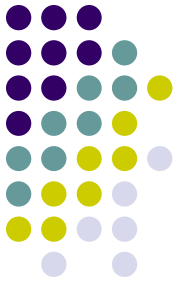


Transportation Modeling Forum



June 12, 2019

Forum Agenda



Regional Count Database

TDM Toolbox / CAP Analysis

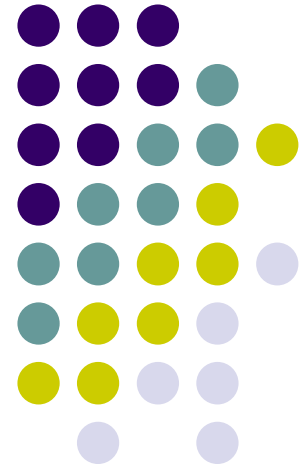
ABM2+ Model Development

Regional Count Database



Mike Calandra

Mike.Calandra@sandag.org



Overview



- Contract
- Modules
- Features and Goals
- Application Customization
- Account Setup
- Upcoming Training
- Application Demonstration

Contract



- Full RFP process
- Three modules
- 10 years of maintenance

A screenshot of the SANDAG Transportation Data Management System (MS2) web interface. The interface features the SANDAG logo on the left and the MS2 logo on the right. Below the logos are navigation links for TCDS, Help, Refresh, and Support. A menu bar contains buttons for Home, TMC, TCLS, TTDS, PMS, PMDS, RSMS, NMDS, PMMS, WOTS, and RTTV. Below the menu bar are buttons for Backup, Admin, Login, Logout, + Locate, + Locate All, and Email This. The main content area displays "New: Spot |" and "Welcome: mike.calandra" with a link for "Auto-Locate OFF". At the bottom, there are buttons for List View, All DIRs, Report Center, Save Search, Ad-Hoc Rpts, Graphs/Rpts, Load Search, and Build Search.

Modules



- Transportation Data Management System (TDMS)
 - Traffic Count Database System (TCDS)
 - Average Daily Traffic
 - Short (hose) Counts
 - Continuous Counts
 - Turning Movement Counts (TMC)
 - Lefts, throughs and rights at intersections
 - Non-Motorized Database System (NMDS)
 - Pedestrian and bicycle counts

Features



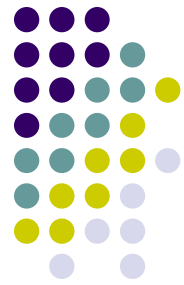
- Stable cloud-based environment
- User permission levels
- Interactive mapping
- Local arterial counts only
- Custom report generation
- Bulk download
- Bulk upload from field devices

Goals



- New approach of data management
 - Replace existing annual solicitation to update observed traffic counts via static PDFs with continuous updates to a robust database
 - Travel demand model calibration

Application Customizations



- Migration of existing legacy ADTs
- Convert PDF data to interactive points

City of La Mesa

Primary Street
 JACKSON DR
 JACKSON DR

1st Cross Street
 MURRAY DR
 GROSSMONT BLVD

2nd Cross Street
 GROSSMONT BLVD
 HAYES ST

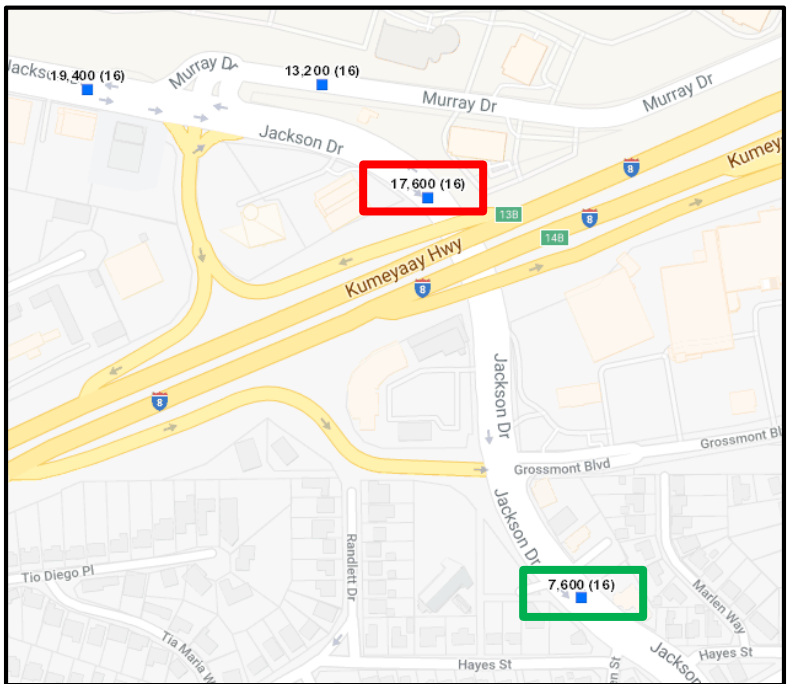
2011
 17600 N
 7600 N

2012
 17600 N
 7600 N

2013
 17600 N
 7600 N

2014
 17600 N
 7600 N

2015
 17600 N
 7600 N



Application Customizations



- Migration of existing pedestrian and bicycle counts
 - Coming soon
- No existing turning movement data to migrate
- Incorporation of local GIS data
- Linked to the ABM for model calibration

Account Setup



- Permission levels
 - Site Manager Read/Write & add users
 - Admin Read/Write
 - User Read only
- Desire multiple logins for each jurisdiction
 - Request a login by sending an email to:
 - mike.calandra@sandag.org
 - joaquin.ortega@sandag.org

Account Setup



- Login instructions document
 - User Name: first.last
 - Password: (found in the document)
- **Please change your generic password the first time you login!**

Application Demonstration



- High level overview of the system
- Basic editing of points
 - The conversion of PDF data to interactive GIS points can require some review
 - Moving count points
 - Updating point metadata
 - Updating count data

<https://sandag.ms2soft.com/tcds/tsearch.asp?loc=Sandag&mod=TCDS>

TDM Toolbox / CAP Analysis

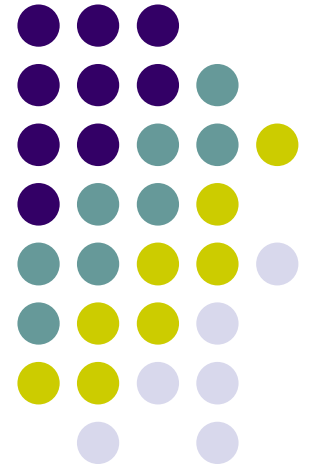


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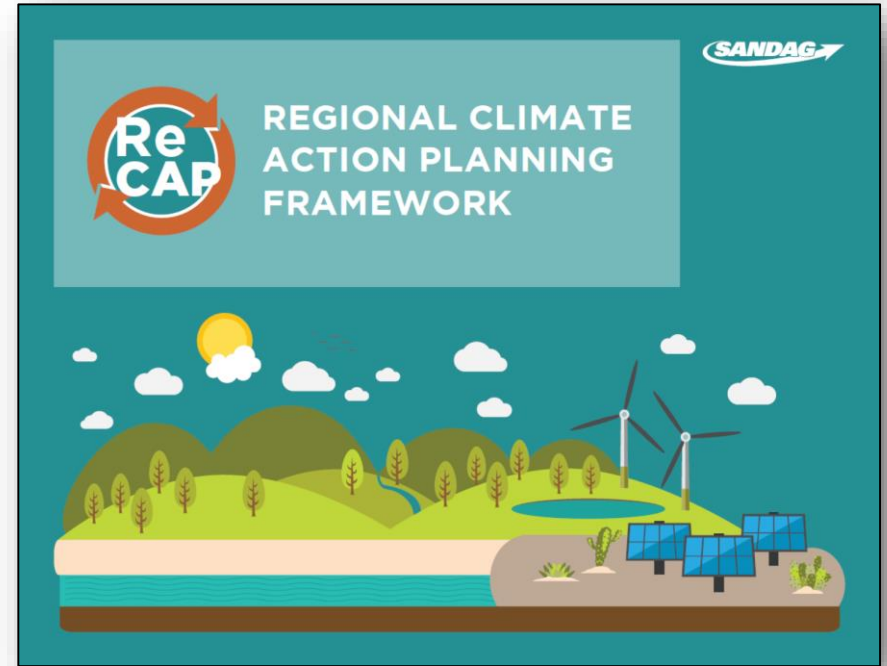
CLIMATE



Climate Action Plan Analysis

Transportation Modeling Forum | June 12, 2019

ReCAP Overview



1 Develop and maintain CAP



2 Implement CAP

3 Monitor and report progress

sandag.org/climate

SANDAG Roadmap Program Climate Action Planning Services

Custom CAP Services

- CAP Development, Implementation Plans, Benefit-Cost Analysis
- Currently working with seven cities

ReCAP Snapshots

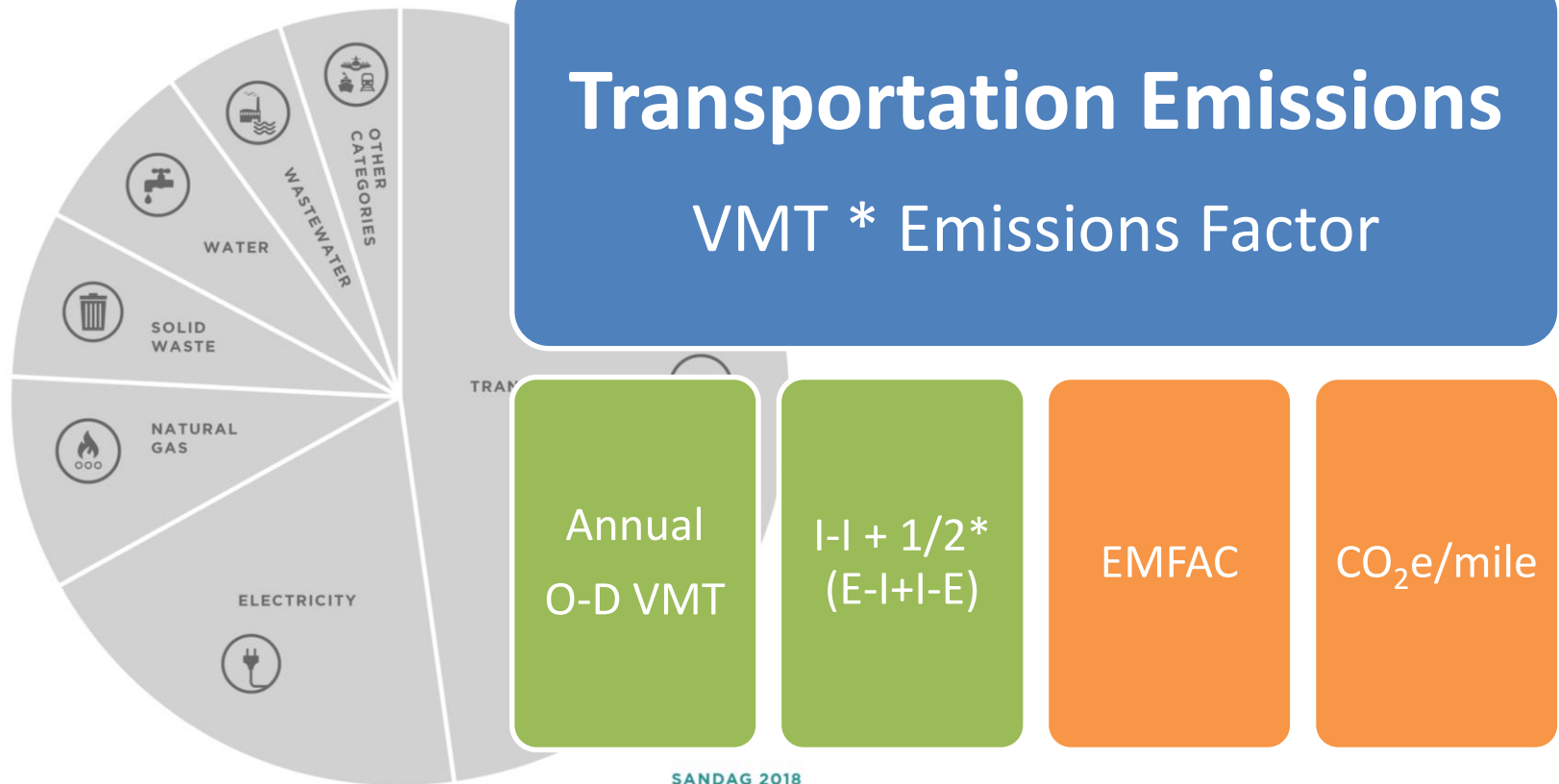
- GHG Emissions Inventory, Performance Indicators
- Planned updates for Roadmap cities every 2 years

Climate Action Data Portal

- Forthcoming web-based tool for CAP-related data

CAP Analysis GHG Emissions Inventory

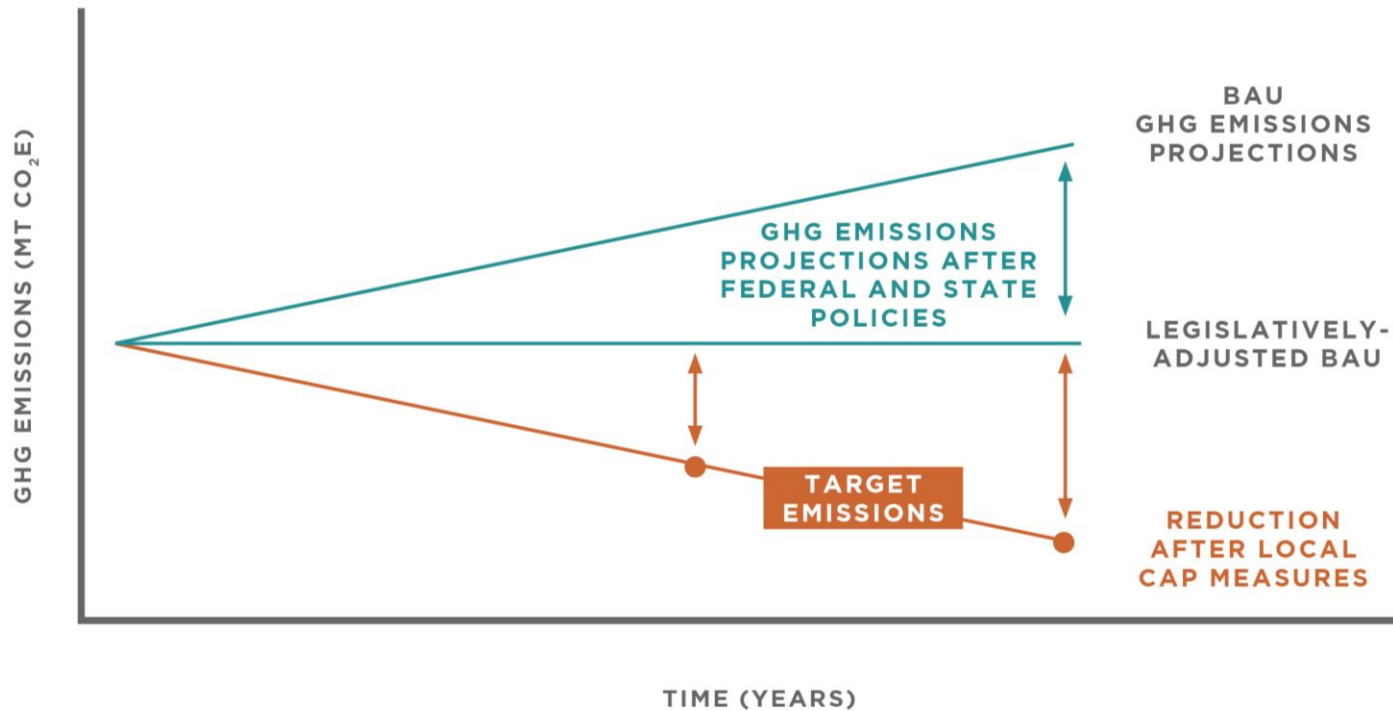
Sample GHG emissions inventory



CAP Analysis

Emissions Projections and Targets

Sample CAP wedge chart

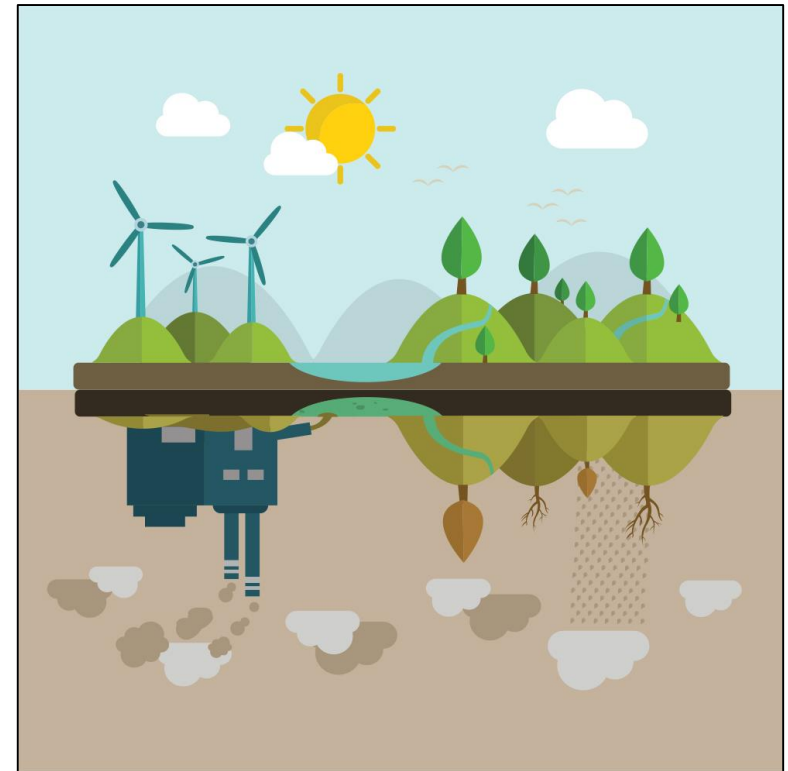


SANDAG 2018

CAP Analysis

GHG Reduction Measure Quantification

- Closing the Gap
Gap between BAU projection and GHG targets
- Quantify GHG reductions from measures
 - State Measures
 - E.g., Zero Emission Vehicles
 - Local CAP measures
 - E.g., Bike infrastructure



CAP Monitoring Framework

Assess progress toward GHG reduction targets and CAP measure implementation

1. Community-wide GHG Inventory

Updated every 2 years (ABM VMT data)

2. Activity Data for CAP Measures

Best available, regionally consistent observed data

3. Recent Accomplishments

Jurisdiction-specific actions undertaken

ReCAP Snapshot Template



ReCAP CITY OF [INSERT HERE] SNAPSHOT

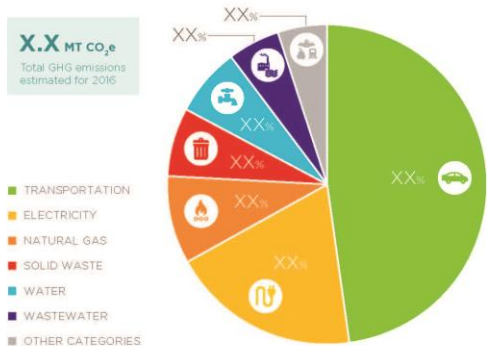
The ReCAP Snapshot is prepared for the City as a part of the SANDAG Regional Climate Action Planning Framework (ReCAP) to assist cities with monitoring greenhouse gas (GHG) emissions and/or climate action plan (CAP) implementation over time. More information, including a FAQ document and Methods and Data Sources Summary, is available at sandag.org/climate.

RECENT ACCOMPLISHMENTS

- 1 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet
- 2 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet
- 3 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet
- 4 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet
- 5 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet

GHG INVENTORY*

*This GHG inventory is based on 2016 data, which is the best available data.



JURISDICTION QUICK FACTS

- # population in 2016
- # square miles
- # households in 2016

Current CAP progress:
Adopted 20XX

Subregion:
XX

ReCAP PERFORMANCE INDICATORS FOR THE CITY OF [INSERT HERE]

These select performance indicators represent best available current data for common GHG reduction activities included in local CAPs across the SANDAG region and may not align precisely to GHG reduction measures and/or the metrics identified within a jurisdiction's CAP.

TRANSPORTATION

COMMUNITY-WIDE

- # public electric vehicle chargers (cumulative)
- # clean vehicles registered (X% total registered vehicles)
- # total miles of bike lanes by class (#per square mile)

MUNICIPAL

- # passengers served by transit stops per weekday
- # local businesses participating in SANDAG iCommuter program events

MUNICIPAL

- # electric vehicle chargers
- # clean vehicles in fleet

ENERGY EFFICIENCY

COMMUNITY-WIDE

- # MWh of electricity consumed
- # million therms of natural gas consumed
- # MWh electricity saved through SDG&E programs

MUNICIPAL

- # MWh of electricity consumed
- # therms of natural gas consumed
- # energy efficiency projects installed
- # kWh/therms energy reduced due to retrofits

WATER + WASTEWATER

COMMUNITY-WIDE

- # gallons water used/person/day
- # gallons wastewater produced/person/day

RENEWABLE ENERGY

COMMUNITY-WIDE

- ##% renewables in grid electricity supply
- # MW cumulative PV installed

MUNICIPAL

- # kW PV installed

SOLID WASTE

COMMUNITY-WIDE

- # lbs waste disposed in landfill/person/day
- ##% waste diverted

CARBON SEQUESTRATION

COMMUNITY-WIDE

- # trees planted



City Name | ReCAP Snapshot - June 2019 Edition

Ongoing CAP Activities

- Iterative nature of CAP planning
Plan – Implement – Monitor – Update
- Opportunities to improve analysis
Data, research, information sharing
- Regional Plan

Questions?

Allison Wood
allison.wood@sandag.org



SANDAG Mobility Management Toolbox

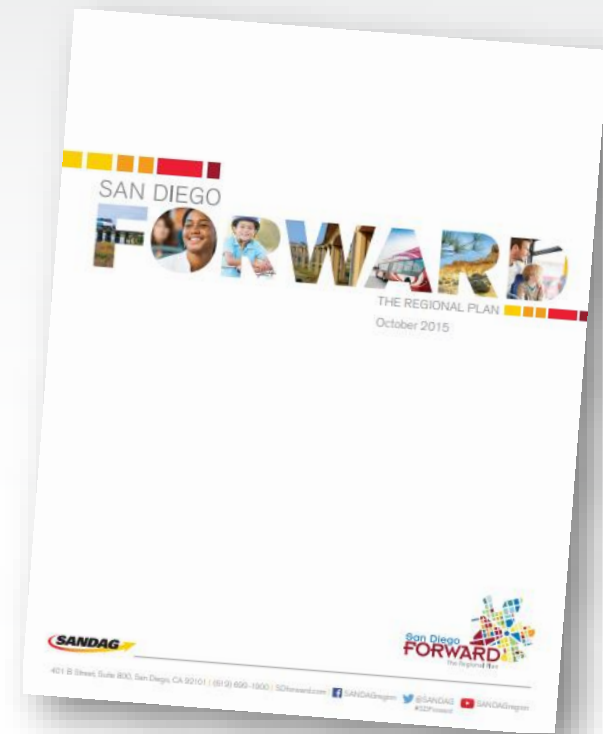
Transportation Modeling Forum

June 12, 2019



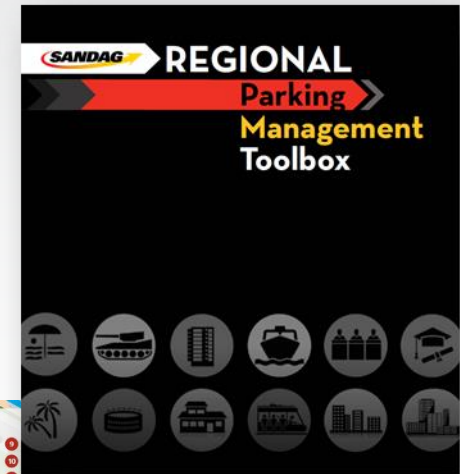
Mobility Management at the Regional Level

- SANDAG incorporates a variety of mobility management strategies in the Regional Plan:
 - *Transportation Demand Management (TDM)*
 - *Transportation System Management (TSM)*
- SANDAG is designated the area-wide clearinghouse for the review of environmental documents and or projects



Regional Resources

- Regional Mobility Hub Strategy
- Regional Parking Management Toolbox
- Integrating TDM into the Planning and Development Process
- Mobility Management Toolbox (under development)



Mobility Management Toolbox

- Caltrans Strategic Partnerships Planning Grant
- Quantify vehicle miles traveled (VMT) reductions resulting from TDM and TSM implementation
- Key resource during the development review process and for transportation analyses required under CEQA
- Help jurisdictions implement SB743
- Support CAP implementation and monitoring

Regional Stakeholder Outreach

- Survey of local jurisdictions & interviews in Summer 2018
- Focus groups with industry experts, development community, public agency staff
- Regional stakeholder workshop in November 2018
- Webinar in December 2019



Literature Review & Case Study Research

- Review available research
 - Compilations and meta-analyses
 - Strategy-specific studies
 - Existing calculator tools
- Review current practices for implementation of TDM and TSM as mitigation strategies and SB 743 implementation



Mobility Management Strategies with Defensible VMT Reduction Estimates

Land Use Strategies

- Transit oriented development (TOD)
- Mixed use development

Employer Commute Programs

- Employer commute program
- Employer carpool program
- Employer vanpool program
- Employer transit subsidy
- Employer telework program

Neighborhood Enhancements

- Street connectivity improvements
- Pedestrian facility improvements
- Bikeway network expansion
- Bike facility improvement

Parking Management

- Parking pricing
- Parking cash-out

Transit Strategies

- Transit service expansion
- Transit frequency improvements
- Transit supportive treatments
- Transit fare reduction
- Microtransit (NEV Shuttle)

Neighborhood Enhancements

- Carshare
- Bikeshare
- Community-based travel planning

VMT Reduction Calculator

DRAFT MOBILITY MANAGEMENT VMT REDUCTION CALCULATOR TOOL



Overview

The Mobility Management VMT Reduction Calculator Tool estimates the percent reduction in vehicle miles traveled (VMT). This Excel tool is intended to act as a resource for evaluating and quantifying the impacts of mobility management strategies as part of the development review and transportation analysis process. The toolbox supports the goals of SB 743 (Steinberg, 2013) by providing jurisdictions and developers with a resource to quantify VMT reductions resulting from implementation of a variety of mitigation strategies at various scales.

The tool operates at two geographic scales: project/site level and community/city level. Depending on the project location and project type, users can select appropriate strategies of interest for mitigating transportation impacts.

Some strategies reduce VMT only from employee commute trips. Other strategies reduce VMT from all project-related trips or all community/city trips. The type of VMT affected is shown on the Results pages and on the individual strategy pages.

Each strategy requires that the user input values that are used to calculate the percent reduction in VMT for each selected strategy. For many strategies, the tool offers default parameters that can be replaced with user-provided values if available.

This project was funded by a Caltrans Strategic Partnerships Planning Grant. This project is available as a resource for local jurisdictions. Local jurisdictions are under no obligation to use this tool in their development.

Instructions

Follow the steps below:

1. Under the "Project Information" section below, select the scale of analysis.
2. Select the location of analysis, using the drop-down menus below. If San Diego City or Unincorporated San Diego County is selected, the user has the ability to select the Community Plan Area location.
3. Depending on the scale of analysis, different mobility management strategies are available for consideration. Click on a strategy of interest by selecting the strategy name. The hyperlink will take the user to that strategy page. Each strategy page requires the user to update input cells to estimate the percent VMT reduction. See **Legend** to the right for a display of the different cell styles present in the strategy formulae.
4. Using hyperlinks, the user can navigate to the appropriate Results page to see the individual strategy and cumulative results.
5. Additional strategies can be selected, and the Results page will reflect the combined impact of multiple strategies. If the user does not want to include the impact of a strategy with the cumulative results, they may click "Exclude from Results" on the strategy page (see **Legend**).
6. Once the user has reviewed the individual strategy and cumulative results on the appropriate Results page, they can click the "Print Results" hyperlink to take them to a printable page with a summary of project information, percent VMT reduction, and citations for the strategies.

Legend

Below are the different cell styles the user will see in the formulae of the strategy pages. Not all strategies use each cell style.

	= constant, coefficient, or default value, locked
	= user input, values may be restricted, unlocked
	= optional user input, values may be restricted, unlocked
	= if optional input entered, then default will be overridden, locked
	= linked user input from other strategy page, locked
	= hidden help text visible if user hovers cursor over cell, locked
	= intermediate calculation in formula, locked
	= strategy output, locked
	= strategy output, max achievable reduction, may be capped, locked
	= user input, clickable checkbox to exclude strategy output, object

VMT Reduction Calculator Demo

Mobility Management Strategies

Project/Site-Level Strategies

Project-Level Results

Employer Commute Trip Reduction Programs

Strategies implemented by employers that encourage workers to commute by modes other than single-occupant vehicle (SOV)

- 1A [Voluntary Employer Commute Program](#)
- 1B [Mandatory Employer Commute Program](#)
- 1C [Employer Carpool Program](#)
- 1D [Employer Transit Pass Subsidy](#)
- 1E [Employer Vanpool Program](#)
- 1F [Employer Telework Program](#)

Land Use Strategies

Strategies that modify the location or characteristics of development projects to encourage non-SOV travel modes

- 2A [Transit Oriented Development](#)
- 2B [Mixed Use Development](#)

Parking Management

Strategies that discourage SOV travel by modifying the price or supply of vehicle parking

- 3A [Parking Pricing](#)
- 3B [Parking Cash Out](#)

Community/City-Level Strategies

Community-Level Results

Neighborhood Enhancements

Strategies that improve or encourage neighborhood-level bicycle, pedestrian, and other multimodal travel options

- 4A [Street Connectivity Improvement](#)
- 4B [Pedestrian Facility Improvement](#)
- 4C [Bikeway Network Expansion](#)
- 4D [Bike Facility Improvement](#)
- 4E [Bikeshare](#)
- 4F [Carshare](#)
- 4G [Community-Based Travel Planning](#)

Transit Strategies

Strategies that improve transit service and cause a mode shift from SOV to transit

- 5A [Transit Service Expansion](#)
- 5B [Transit Frequency Improvements](#)
- 5C [Transit-Supportive Treatments](#)
- 5D [Transit Fare Reduction](#)
- 5E [Microtransit/NEV Shuttle](#)

Mobility Management Guidebook



EMPLOYER VANPOOL PROGRAM

Vanpools typically carry seven to fifteen passengers and operate weekdays, traveling between one or two common pick-up locations (typically a park-and-ride lot or a transit station) and the place of work. Vanpool programs can provide vehicles owned by an organization to commuters who live in a common geographic area and who share an employment destination. The vans may be operated by a driver or by the commuters themselves. Some vanpool programs provide outreach services to attract potential riders.

SCALE OF APPLICATION: Project Scale

IMPACT ON VMT

Reduction of up to 20% of work trip VMT

- VMT reduction affected by:
- The number of vanpools established through the program
 - The extent to which vanpool riders previously were driving alone (vs. already carpooling)
 - The extent to which vanpool riders drive to a vanpool pick-up location
 - The average length of vanpool trips

IMPLEMENTATION CONSIDERATIONS

- Most appropriate for larger employers with workers centralized in one location and working regular hours
- Particularly well suited for longer commutes (greater than 20 miles one-way)
- Employers can offer preferential parking locations for vanpools

COMPLEMENTARY STRATEGIES

- Often implemented as part of a broader employer commute trip reduction program.

CASE STUDY

Ilumina, a global biotechnology company headquartered in San Diego, helps pay for those who vanpool by providing each person with \$130 per month for expenses. The program grew to 18 vanpools in 2018.



Image source: SANDAG iCommute

IMPLEMENTATION RESOURCES

- The SANDAG Vanpool Program provides a subsidy of up to \$400 per month to offset the lease cost. Employees may be eligible for additional incentives from their employer. See www.icommutesd.com/vanpool/vanpool

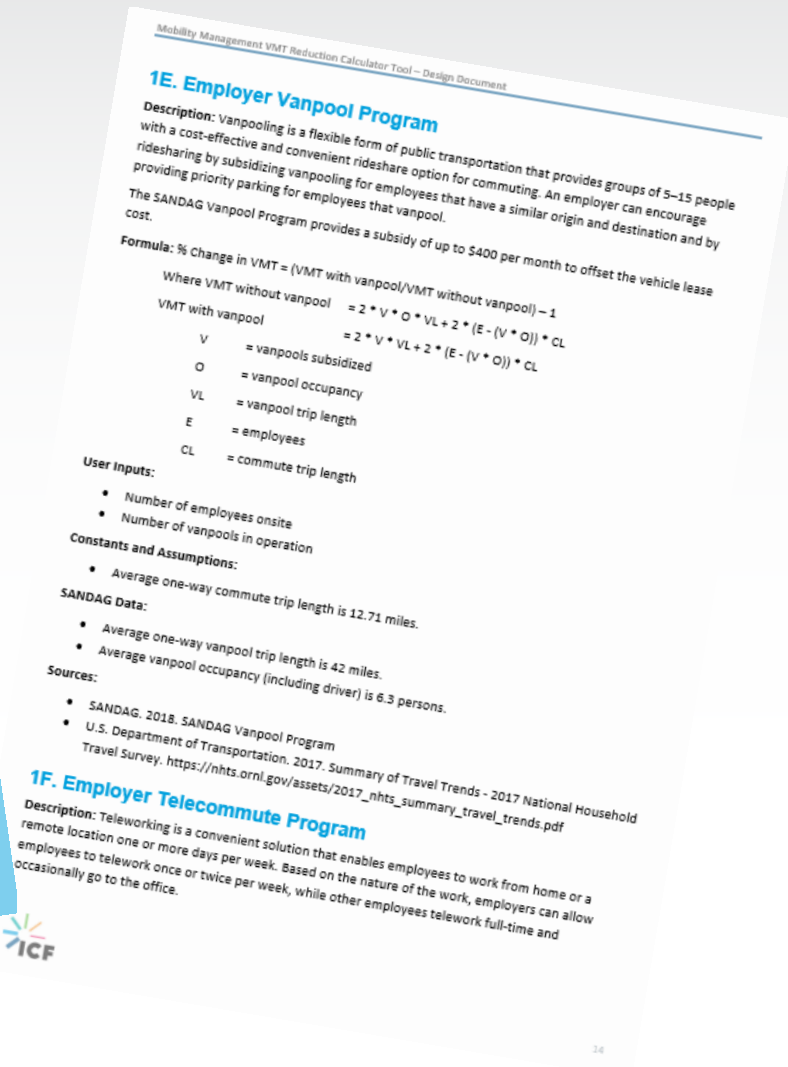
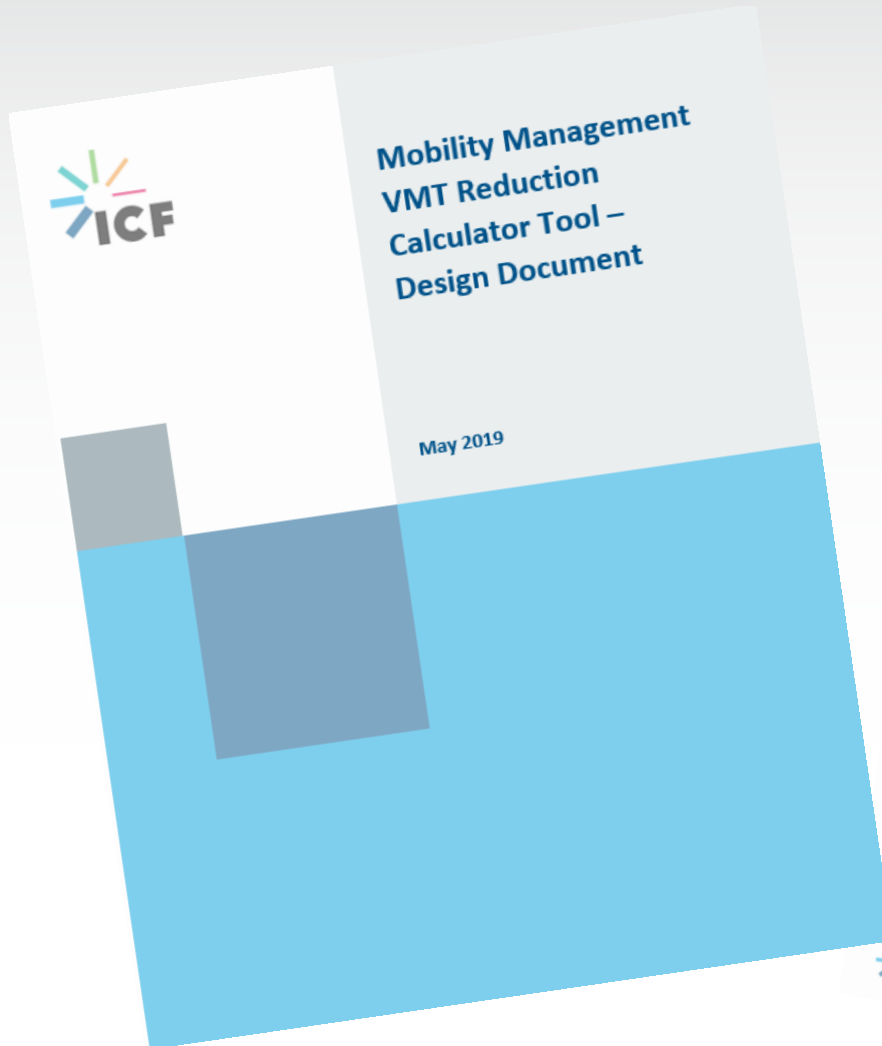
REFERENCE

TCRP Report 95: Traveler Response to Transportation System Changes Handbook, Third Edition, Chapter 5, Vanpools and Buspools, 2005
www.trb.org/Publications/Blurbs/156124.aspx

COMMUTE TRIP REDUCTION PROGRAMS



Toolbox Design Document



Next Steps

- All project deliverables finalized by June 30
 - Mobility Management Toolbox Guidebook
 - VMT Reduction Calculator
 - Design Document
 - Recommendations for Application
 - User Training Videos

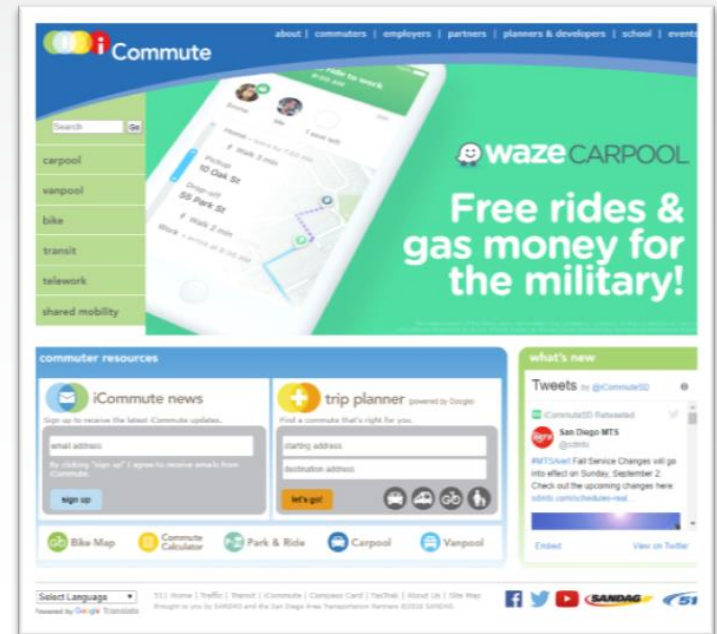
Questions?

Mobility Management Toolbox
resources available:

www.icommutesd.com/localgov

Krystal Ayala, Regional Planner

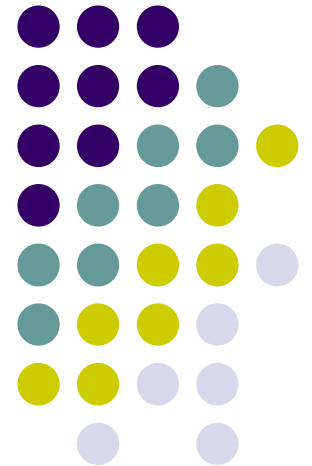
kay@sandag.org



Preamble to the ABM2+ Model Development

Rick Curry

Rick.Curry@sandag.org



RTP/RP/SCS Acronym Soup



RTP = Regional Transportation Plan

- 1975 to 2007
- 2020 Federal Plan

RPs & SCSs

- 2011, 2015, 2021
- RP = Regional Plan
 - Merge of RTP & Regional Comprehensive Plan (RCP)
- SCS = Sustainable Communities Strategy
 - SB375 requires regional metropolitan planning organizations in California to develop a SCS, or long-range plan, which aligns transportation, housing, and land use decisions toward achieving GHG emissions reduction targets set by the California Air Resources Board (CARB)



RP / RTP / SCS Model Linkage



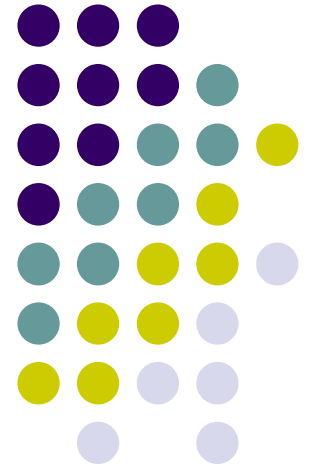
RP / RTP / SCS	Model Version
2011 RP (1 st SCS)	4-Step v12.1
2015 RP (2 nd SCS)	ABM1 v13.2.3
<i>Current Model</i>	<i>ABM1 v13.3.2</i>
2019 RP (3rd SCS)	ABM2 v14.0.1
2020 RTP	ABM2 v14.1.0
2021 RP (3 rd SCS)	ABM2+
2025 RP	ABM3

ABM2+ Model Development



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wu.sun@sandag.org



Modeling Challenges



Emerging technologies & modes

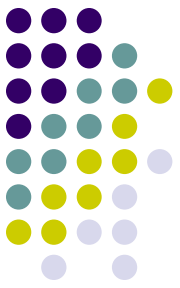
- Limited observed data
- Limited opportunity for analogy
- Potential transformative changes in travel behavior

Traditional single-point forecasts ineffective

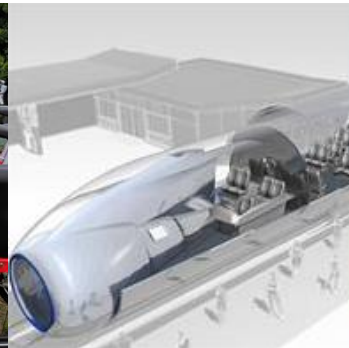
Scenario testing preferred

- Multiple runs with systematically varied parameters

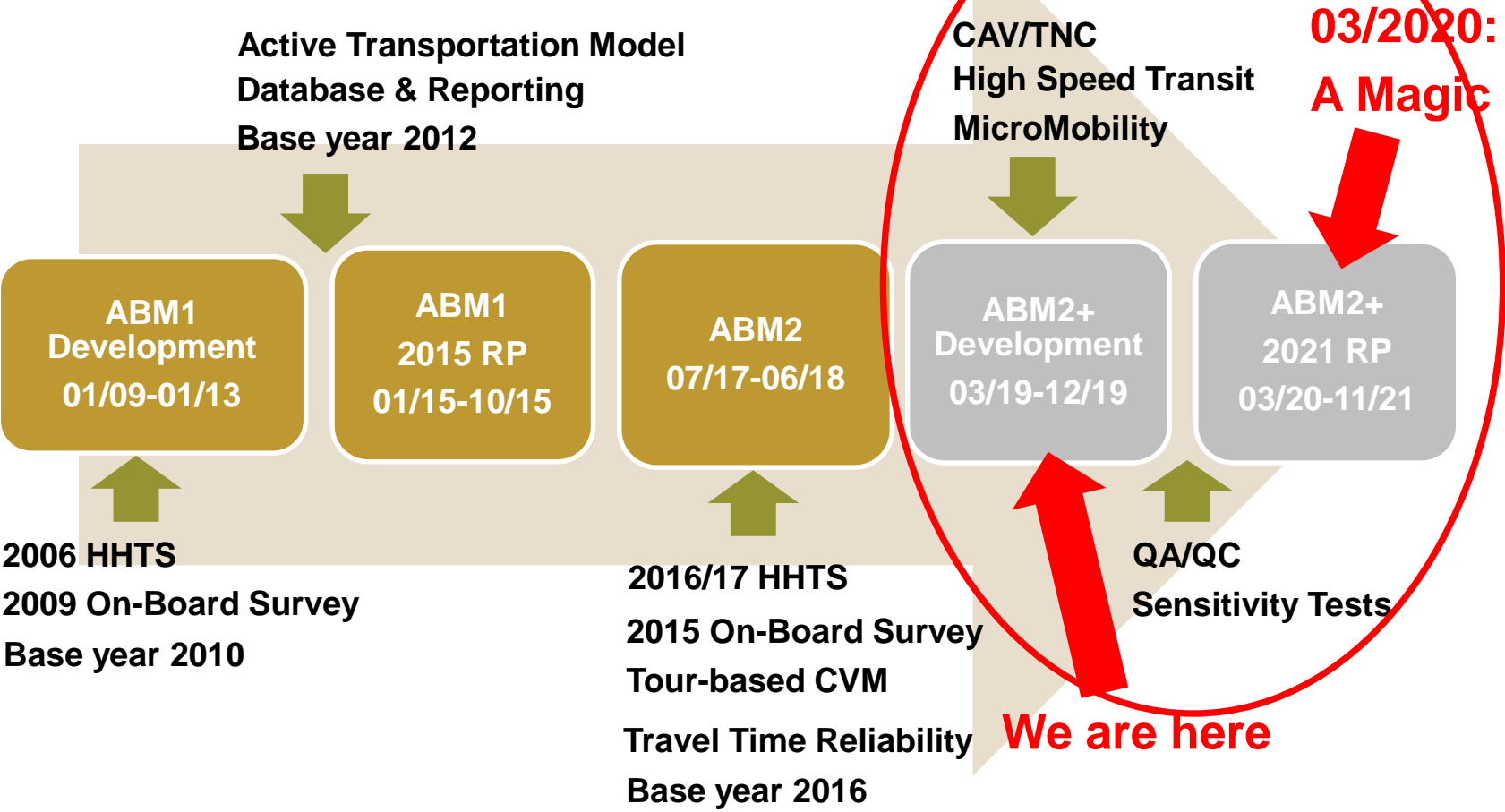
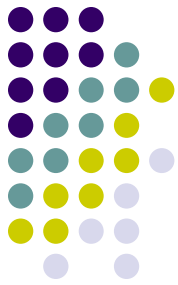
Emerging Technologies & Modes



Transportation network company (TNC)
Connected & Autonomous Vehicles (CAV)
High-speed transit services
Micro mobility



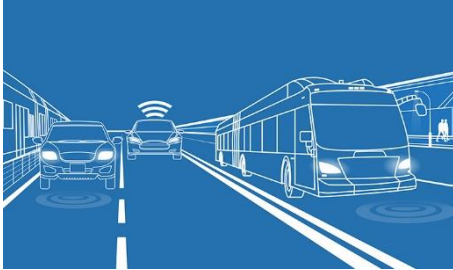
Roadmap & ABM2+



Why modeling emerging technologies?



COMPLETE CORRIDORS



TRANSIT LEAP



NEXT OS



MOBILITY HUBS



FLEXIBLE FLEETS



Modeling TNCs



Effects of TNC availability on auto ownership

- Via addition of TNC nest to transit accessibilities

Extension of mode choice

- Mobility-as-a-service nest
 - Taxi, TNC-single, & TNC-shared
 - User-configurable wait time and cost functions
- TNC-transit access mode similar to KNR-transit
- Alternative-specific constants to reflect non-included attributes
 - Calibrated to TNC survey

Modeling CAVs (1)



Auto ownership model-extended

- Human-driven vs. autonomous vehicles

Vehicle type availability

- Households with both HV and AV – is an AV available for the tour?

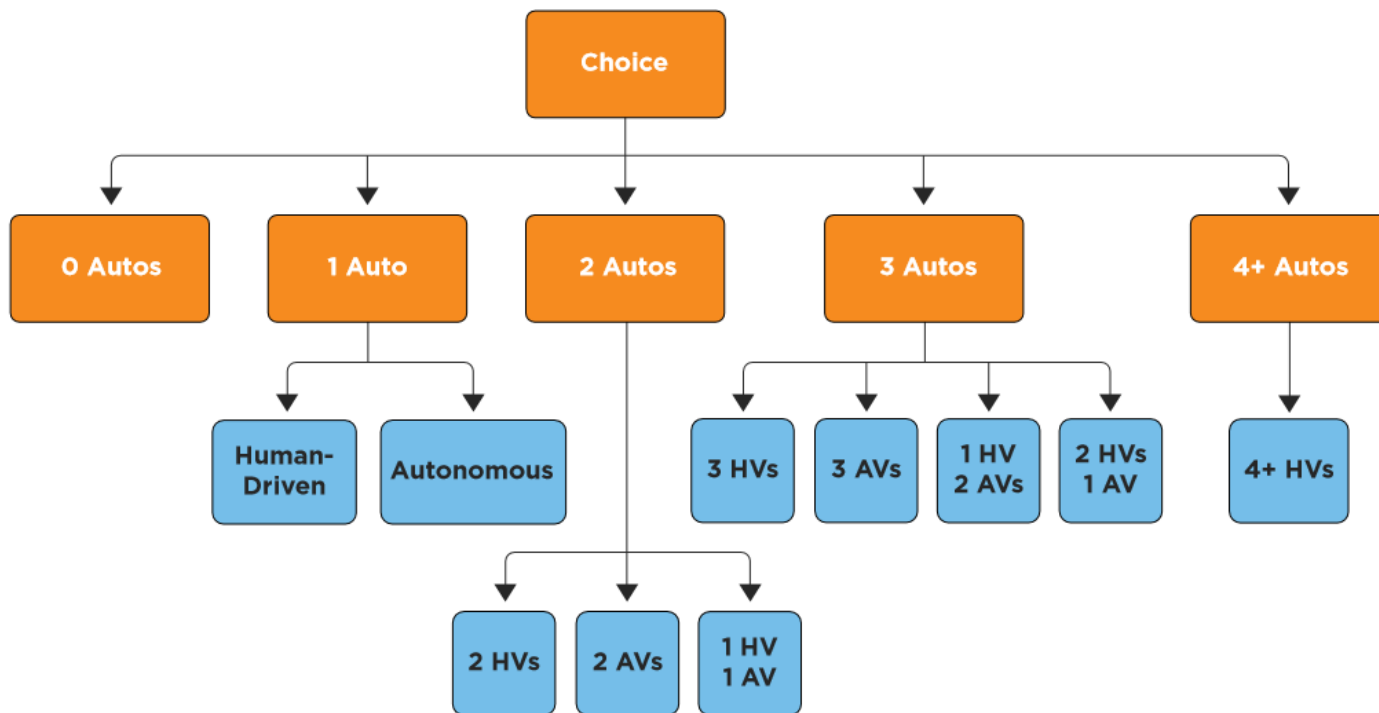
Mode choice model-extended

- Minimum age for drive-alone
- In-vehicle time sensitivity
- Auto operating cost modifier; parking cost modifier; terminal time modifier

Modeling CAVs (2)



Extended Auto Ownership Model



Modeling CAVs (3)



Highway Assignment

- Add AVs to non-AVs using AV factors
 - Represent assumed AV efficiencies on PCEs
- Assign AVs separately
 - Track AV demand on AV-only lanes facilities
 - Challenge(s): already 30 vehicle classes; would increase model runtime significantly

Capacity improvements

- Limited improvements in mixed-fleet situations
- Larger improvements in 100% AV situations

Modeling Shared Autonomous Vehicles (SAVs)



SAV routing algorithm

- Approximation of SAV routing based on Lyft Line algorithm
- Inputs from ABM
 - Trip list
 - Travel time and distance

Preliminary Results

- Approximately 420k vehicles to serve 11.5M trips
- 0.35 veh/household vs. current 1.8 veh/household

Modeling High Speed Transit Mode



Add new mode to EMME transit network

Code station-station times and headways

- Actual wait times may require iterating with demand depending on assumed vehicle capacities

Compete in ‘premium’ and ‘premium + local with transfer’ mode alternatives

High Speed Transit time & distance skimmed separately

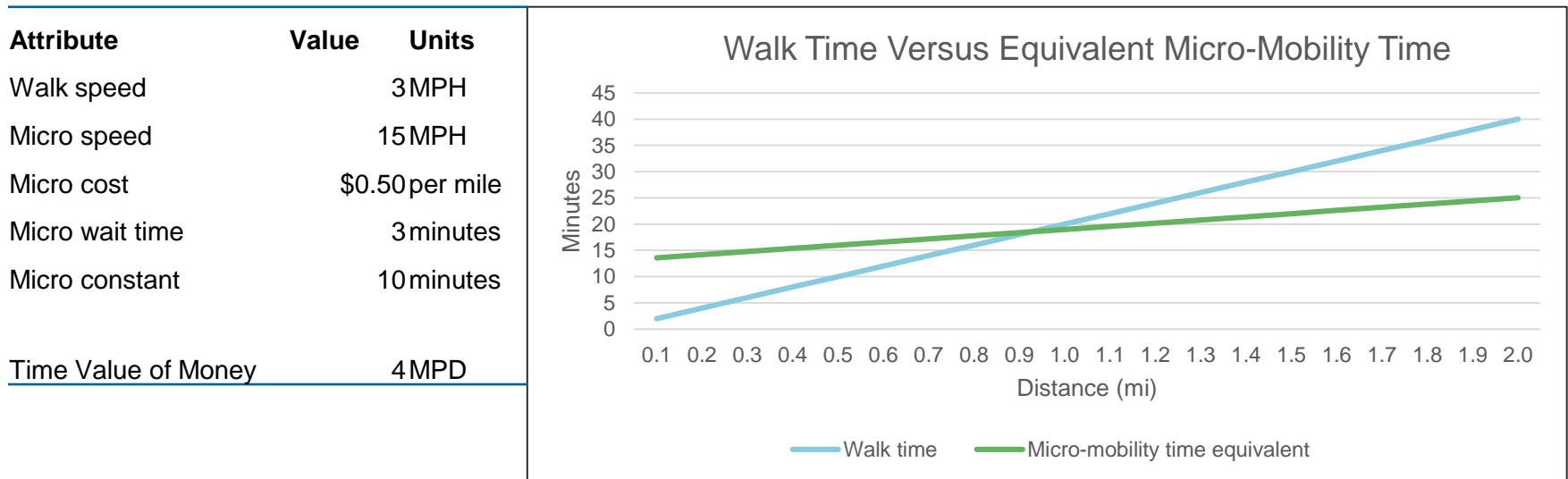
High speed transit-specific constants in mode/transit path choice

Modeling MicroMobility



Modeled via walk-transit-walk mode

- Max “walk” distance increase based on availability assumptions
- Number of zones accessible to transit increase
- Walk times reflect generalized cost of walk and MicroMobility
- Either all-or-nothing or apply choice model to estimate micro-mobility demand from walk-transit trips



What Have We Done Beyond Just Plumbing Work?



Technical Advisory Committee (TAC)

- National leaders in travel demand modeling
- TAC members from FHWA, CARB, MPOs, academia, & an independent consultant

Goals

- Evaluate exiting ABM2
- Review proposed ABM2+ methodologies
- Engage in multi-year guidance
 - 05/2019 meeting
 - 11/2019 meeting
 - Once a year after

Forum Agenda



Regional Count Database

TDM Toolbox / CAP Analysis

ABM2+ Model Development

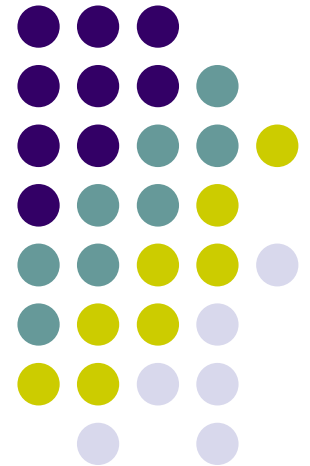
**Next
Transportation
Model Forum:**

**December 11,
2019**

SANDAG



Transportation Modeling Forum



June 12, 2019