Attachment:
Emission Reduction Inputs and Default Assumptions

Emission Reduction Inputs

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
Ridesharing / Trip Reduction Project Type = 5a-h, 8b, 9a-c, 11a, or 11b Worksheet = Trip Reduction FYE 15 Note: For ridesharing the default maximum number of vehicle trips reduced per day is 1% of target population.	**Ridesharing** • # Years Effectiveness • # Trips/Day (1-way) eliminated [% of target population (# employees)] • Days/Yr • Trip Length (1-way) • # New Trips/Day (1-way) to access transit • Days/Yr • Trip Length (1-way)	• Enter in Cost Effectiveness Inputs, up to 2 years • Enter in Step 1-Column A, 1% of target population • Enter in Step 1-Column B, 240 days (max.) • Step 1-Column C, Default = 16 miles (1-way commute distance from MTC's Commute Profile) • Step 2-Column A, Default = 50% of # Trips/Day Eliminated (Step 1-Column A) • Enter in Step 2-Column B, same # as Step 1-Column B • Enter in Step 2-Column C, Default = 3 miles
	School-Based Ridesharing • # Years Effectiveness • # Trips/Day (1-way) eliminated [% of target population (total # students)] • Days/Yr • Trip Length (1-way)	• Enter in Cost Effectiveness Inputs, up to 2 yrs • Step 1-Column A, No Default • Enter in Step 1-Column B, 180 days (max.) • Step 1-Column C, 1-3 miles
	Transit Incentive Campaigns • # Years Effectiveness • # Trips/Day (1-way) eliminated [% of target population]. Use survey data if available. • Days/Yr • Trip Length (1-way), based on routes accessed • # New Trips/Day (1-way) to access transit • Days/Yr (new trips) • Trip Length (1-way) for new trips	• Enter in Cost Effectiveness Inputs, up to 2 yrs • Step 1-Column A, No default • Enter in Step 1-Column B, 90 days (max.) if # Trips/Day based on % of target population. If # Trips/Day based on participants, 240 days (max). • Step 1-Column C, No Default • Step 2-Column A, No Default • Enter in Step 2 - same as # days used in Step 1 • Step 2-Column C, Default = 3 miles
	Guaranteed Ride Home Programs • # Years Effectiveness • # Trips/Day (1-way) eliminated • Days/Yr • Trip Length (1-way)	• Enter in Cost Effectiveness Inputs, up to 2 years • Enter in Step 1-Column A, 0.2% of target population. • Enter in Step 1-Column B, 240 days (Max.) • Step 1-Column C, Default = 16 miles

	Transit Vehicle Signal Prioritization • # Years Effectiveness • # Trips/Day (1-way) eliminated • Days/Yr • Trip Length (1-way)	• Enter in Cost Effectiveness Inputs, 2 yrs • Step 1-Column A, No Default • Enter in Step 1-Column B, 250 days (max) • Step 1-Column C, No Default

Emission Reduction Inputs

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
Bicycle Projects Project Type = 7a-h Worksheet = Trip Reduction FYE 15 Methodology to estimate number of trips reduced for bike paths, lanes, & routes based on: - the type of facility (Class 1, 2, or 3) - the length of the project segment - the traffic volume (ADT) on the facility. For Class 1 projects, use the ADT on the most appropriate parallel road.	**Bicycle Projects (Paths, Lanes, Routes)**	
	• # Years Effectiveness Class 1 bike path (or bike bridge) Class 2 bike lane Class 3 bike route	• Enter in Cost Effectiveness Inputs: Not to exceed 20 years for Class 1 projects (trails/paths) Not to exceed 15 years for Class 2 & Class 3 projects
For gap closure projects (where project will close a gap between two existing segments of bikeway), use the length for the total facility. Note: the maximum number of vehicle trips reduced per day is 240. The Air District generally assumes that no bike project will reduce more than 240 vehicle trips per day.	• # Trips/Day (1-way) eliminated (depends on length of project segment and ADT on project segment) Class 1 bike path & Class 2 bike lane ADT ≤ 12,000 vehicles per day Class 1 bike path & Class 2 bike lane ADT > 12,000 and ≤ 24,000 Class 1 bike path and Class 2 bike lane ADT > 24,000 and ≤ 30,000 Maximum is 30,000. Class 3 bike route or bicycle boulevard	• Enter in Step 1-Column A: Length ≤ 1 mile = 0.4% ADT Length >1 and ≤ 2 miles = 0.6% ADT Length >2 miles = 0.8% ADT Length ≤ 1 mile = 0.3% ADT Length > 1 and ≤ 2 miles = 0.45% ADT Length > 2 miles = 0.6% ADT Length ≤ 1 mile = 0.25% ADT Length > 1 and ≤ 2 miles = 0.35% ADT Length > 2 miles = 0.45% ADT Route ≤ 1 mile = 0.1% ADT Route > 1 and ≤ 2 miles = 0.15% ADT Route > 2 miles = 0.25% ADT
The Air District normally uses an average trip length of 3 miles (one-way) for bicycle projects.	• Days/Yr • Trip Length (1-way)	• Enter in Step 1-Column B, 240 days • Enter in Step 1-Column C, 3 miles. (Not same as segment length.)

	Bicycle Lockers & Racks • # Years Effectiveness • # Trips/Day (1-way) eliminated • Days/Yr • Trip Length (1-way)	• Enter in Cost Effectiveness Inputs, 10 yrs • Enter in Step 1-Column A: Capacity of lockers x 1 trip/day Capacity of cages x 0.75 trips per day Capacity of racks x 0.5 trips per day • Enter in Step 1-Column B, 240 days • Enter in Step 1-Column C, 3 miles
	Bay Area Bike Share • # Years Effectiveness • # Trips/Day (1-way) eliminated Weekdays • Days/Yr • Trip Length (1-way) Weekends • Days/Yr • Trip Length (1-way)	• Enter in Cost Effectiveness Inputs, 5 yrs • Enter in Step 1-Column A: Number of bikes X 4.5 trips per day X 20% (actual vehicle trips replaced based on Shaheen research dated June 2012) • Enter in Step 1-Column B, 260 days • Enter in Step 1-Column C, 16 miles • Enter in Step 1-Column B, 105 days • Enter in Step 1-Column C, 16 miles

Emission Reduction Inputs

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
Shuttles / Rail-Bus Integration / Transit Info Project Type =6a-i, 10a, or 10b Worksheet = Trip Reduction FYE 15	**Shuttle/Feeder Bus, Rail-Bus Integration, and Transit Information Systems** • # Years Effectiveness # Trips/Day (1-way) eliminated trips. Trips only	• Cost Effectiveness Inputs, up to 2 years • Step 1-Column A,

	from riders who previously would have driven.	For on-going service, use survey results For new service, use 50% of daily seating capacity of vehicle * 67% (% single-occupancy vehicles (SOV) from MTC Commuter Profile)
	• Days/Yr eliminated trips	• 1-Column B, Enter number of operating days. Default =254 days/yr.
	• Trip Length (1-way) eliminated trips. Average trip length that will be eliminated due to shuttle passengers taking train/ferry in conjunction with the shuttle.	• Enter in Step 1-Column C, a survey-based distance, or, if no survey, 16 miles for shuttles and 35 miles for vanpools
Step 2 calculates emissions from new trips generated.	• # Trips/Day (1-way) new trips to access transit	• Step 2-Column A, Use survey data or, if none, a default is 50% of # Trips/Day Eliminated (Step 1-Column A)
	• Days/Yr new trips	• Enter in Step 2-Column B, same # as in Step 1-Column B.
	• Trip Length (1-way) new trips. Average trip length of shuttle passengers that drive from home to the BART/Caltrain station.	• Enter in Step 2-Column C, a survey-based distance, or, if no survey, default is 3 miles for home-to-rail trips.
When possible, emissions from shuttle vehicles should be based on the vehicle engine Executive Order. County Program Manager should consult with Air District staff for guidance. *For vans and shuttle vehicles 14,000 lbs. and lighter, use Step 3A.*	• # Vehicles, Model Year: Number of vehicles with same model year	• Step 3A - Column A, no default.
	• Emission Std.: Emission Standard from list provided.	• 3A - Column B, no default.
	• Vehicle GVW: Weight Class from list provided.	• 3A Column C, no default.
	• ROG, NO_x, Exhaust PM_{10}, and Total PM_{10} Factors: enter factor from appropriate table provided on Emission Factors tab—ARB Table 2 for vehicles model year 2004 and after, or ARB Table 7 for model years 1995-2003.	• 3A Column D through G, no default
	• CO_2 Factor: enter factor from CO_2 Table for Light- and Light Heavy-Duty Shuttles, on Emission Factors tab.	• 3A Column H, no default.
	• Total annual VMT = [length of shuttle/van trip (one-way)] X [# one-way trips per day] X [# days of service per year]. For all vehicles listed in Step 3A.	• 3A Column I, no default.

For buses, use Step 3B. *If a vehicle does not match the factors provided, County Program Manager should consult with Air District staff.*	• ROG, NO_x, Exhaust PM_{10}, Other PM_{10} and CO_2 Factors: enter factor from Emissions for Buses Table provided on Emission Factors tab. • Total annual VMT = [length of shuttle/van trip (one-way)] X [# one-way trips per day] X [# days of service per year]. For all vehicles listed in Step 3B.	• Step 3B: Columns D through H, no default. Note that Step 3B uses Other PM_{10}, not Total PM_{10}. • 3B Column I, no default.

Emission Reduction Inputs

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
Arterial Management Project Type = 8a Worksheet = Arterial Management FYE 15	**Arterial Management** • # Years Effectiveness • Name of Arterial • Segment Length (miles) • Days/Yr. • Time Period • Traffic Volume • Traffic Speed without the Project • Travel Speed with Project	• Enter in Cost Effectiveness Inputs: For signal timing/synchronization, 2 yrs or, with retiming required at 2 yrs, 4 yrs. Each project should include either 2- or 4-year segments, not both. • Column A: Name of the arterial and the direction of travel. • Enter under Column B the length of arterial over which speeds will be increased. • Enter under Column C the number of days per year over which the project would affect traffic. Default is 250 days. • Enter under Column D the time period over which the traffic volumes and speed will change (e.g., 4-7 PM). Include all the hours in a period that will benefit, not just the peak hour. • Enter under Column E the traffic volume before the project for the corresponding Time Period and direction of travel that will make the stated speed change. • Enter under Column F the average traffic speed along the length of the arterial before implementation of the project. • Enter under Column G the average estimated traffic speed along the length of the arterial after implementation of the project. *Note: Maximum increase in speed is 25%.*
[Smart Growth]	**Smart Growth / Traffic Calming**	No default assumptions for "smart growth" or traffic calming projects are available. Provide detailed explanations of any assumptions and calculations in the Notes and Assumptions tab.

Emission Reduction Inputs

Alt-fuel Heavy-Duty Vehicles and Infrastructure

Project Types = 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 2d, 2e, 3a, 3b, 3c, 3d, 3e, 3f, 12a, 12b, 12c

Worksheet = Heavy Duty Vehicle FYE 15

Input Data Needed	Default Assumptions
○ Cost Effectiveness Inputs, # Years Effectiveness. Use separate workbook and Project # for each set of vehicles with different # Years Effectiveness or with different fuel types.	• 3 years is recommended - Not to exceed 7 years.
○ Column B, Unit #: A unique identifier. List each vehicle on a separate row.	○ Column B: No default
• Columns C through E, Baseline Emission Rate: NO_x, ROG, PM factors: See Moyer Table D-2a/b or D-6, based on your vehicle type, weight, and engine model year.	• Columns C through E: For FYE 2015 alt-fuel heavy-duty vehicle projects, including urban buses, the baseline default is the Model Year 2010 emission standards.
• Column F, Annual Fuel Use: Base on average fuel use over 2 years, and document with 2 years of records.	• Column F: No default.
• Column G, Fuel Consumption Factor: Moyer Table D-24	• Column G: Most on-road engines are below 750 horsepower, thus the default value is 18.5.
• Column H, Conversion Factor (g/mi to g/bhp-hr): Input a value only if Baseline Emission Rates (Columns C – E) are in g/mi and Fuel Basis is being used. Notice: enter data in this column or Column J, not both. Use Moyer Table D-28.	• Column H: No default.
• Column I, Annual VMT: Base on average VMT over 2 years, and document with 2 years of mileage records.	• Column I: No default.
• Column J, Conversion Factor (g/bhp-hr to g/mi): Input a value only if Baseline Emission Rates (Columns C – E) are in g/bhp-hr. Notice: enter data in this column **or** Column H, not both. Use Moyer Table D-28.	• Column J: No default.
• Column K, Percent operation in Air District: Only the operation within the Bay Area Air Quality Management District can be counted. Boundaries available from the Air District.	• Column K: No default.
• Columns L through N, New Emission Rate: NO_x, ROG, and PM: Use Executive Order values. Note: FEL engines are not eligible for TFCA funding. CARB certifies engines and provides the engine manufacturers with an Executive Order (EO) for each certified engine family. An example of an EO is shown at the end of this attachment. The EO includes general information about the certified engine such as engine family, displacement, horsepower rating(s), intended service class, and emission control systems. It also shows the applicable certification emission standards as well as the average emission levels measured during the actual certification test procedure. For the purpose of the TFCA Program, the certification emission **standards** are used to calculate emission reductions. The certification emission standards are shown in the row titled "(DIRECT) STD" under the respective "FTP" column headings for each pollutant. For instance, the Cummins 8.3 liter natural gas engine	• Columns L through N: For FYE 2015 heavy-duty vehicle projects, including urban buses, the new vehicle must be certified to *exceed* the Model Year 2010 standard of 0.2 g/bhp-hr of NO_x and 0.01 g/bhp-hr of PM, which are the default values. Some exceptions apply.

Input Data Needed	Default Assumptions
illustrated in the sample was certified to a combined oxides of nitrogen plus non-methane hydrocarbon (NOx+NMHC) emission standard of 1.8 g/bhp-hr, a carbon monoxide (CO) emission standard of 15.5 g/bhp-hr, and a particulate matter (PM) emission standard of 0.03 g/bhp-hr. In the case where an EO shows emission values in the rows labeled "AVERAGE STD" and/or "FEL", the engine is certified for participation in an averaging, banking, and trading (AB&T) program. AB&T engines (i.e., all FEL-certified engines) **are not eligible** to participate in the TFCA Program for new vehicle purchase projects since emission benefits from an engine certified to an FEL level are not surplus emissions.	
• Column O, Replacement Vehicle Cost: Must be supported by a quote for the new alt-fuel vehicle that exceeds standards.	• Column O: No Default.
• Column P, Must be supported by a quote for a new equivalent model vehicle that meets standards (for FYE 2015, the Model Year 2010 Standards).	• Column P: No Default.
• Column Q, Fuel Savings.	• Column Q: Default value is 0%. For new hybrid vehicles, on a case-by-case basis, the Air District may approve another value, based on documented fuel savings relative to a non-hybrid vehicle.
• Column R, Fuel Consumption Factor: Use Moyer Table D-24.	• Column R: Most on-road engines are below 750 horsepower.
• Column S, Conversion Factor (g/mi to g/bhp-hr): Enter a value only if New Emission Rates (Columns L – N) are in g/mi and Fuel Basis is being used. Notice: enter data in this column **or** Column T, not both. Use Moyer Table D-28.	• Column S: No default.
• Column T, Conversion Factor (g/bhp-hr to g/mi): Enter a value **only if** New Baseline Emission Rates (Columns L – N) are in g/bhp-hr. Notice: enter data in this column or Column S, not both. Use Moyer Table D-28.	• Column T: No default.
• Column Y, # Years Effectiveness: Same as in Cost Effectiveness Inputs.	• Column Y: 3 years is recommended - 7 yrs max.
• Column Z, Incremental Cost: The cost of the proposed vehicle minus the baseline vehicle.	• Column Z: Automatically calculated.
• Columns AB – AG, Emission Reductions. All reductions must be surplus to any regulatory, contractual, or other legally binding requirement. Note that if ROG values are not available for both the baseline and the proposed engine, ensure value is zero (0) for ROG, as no ROG emission reductions can be claimed.	• Columns AB – AG. Calculated automatically. Enter zero (0) if a reduction cannot be claimed.
• Column AM, TFCA Funding Amount: Amount of total TFCA funding. The column total must equal Total TFCA Cost from Cost-Effectiveness Inputs at top of worksheet.	• Column AM: Cannot exceed Incremental Cost.

Input Data Needed	Default Assumptions
• Column AP, Actual Weighted CE w/o CRF--Miles Basis ($/ton). Cost-effectiveness based on emissions including weighted PM. **Must meet Policy Requirements.**	• Column AP: Calculated automatically.
• Column AQ, Actual Weighted Contract CE w/o CRF--Fuel Basis ($/ton). Cost-effectiveness based on emissions including weighted PM. **Must meet Policy Requirements.** Emissions and cost-effectiveness calculations **can only be based on fuel usage for the following vehicles:** • Utility vehicles in idling service • Street sweepers • Solid waste collection vehicles. All other vehicles must use mileage basis. If using fuel-based calculations, usage must be based on two years of historical fuel usage documentation (e.g., fuel logs or purchase receipts).	• Column AQ: Calculated automatically.
• Column AS, Baseline CO_2 Factor Based on Mileage: Enter value from CO_2 Emission Factors Table for your fuel and vehicle type (e.g., Medium Heavy Duty Diesel is 1527 g/mi).	• Column AS: No default.
• Column AT, Proposed Engine CO_2 Factor Based on Mileage: Enter value from CO_2 Emission Factors Table for your fuel and vehicle type (e.g., Medium Heavy Duty CNG 1098 g/mi).	• Column AT: No default.
• Column AV, Baseline CO_2 Factor Based on Fuel Use: Enter value from CO_2 Emission Factors Table for your fuel type (e.g., Diesel is 10079 g/mi).	• Column AV: 10079 g/mi.
• Column AW, Proposed Engine CO_2 Factor Based on Fuel Use: Enter value from CO_2 Emission Factors Table for your fuel type (e.g., CNG is 7244 g/mi).	• Column AW: No default.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
Alt-fuel Vehicles and Infrastructure: Light-Duty and Light Heavy-Duty Project Types = 4a, 4b, 4c, 4d, 4e, 12a, 12b, 12c Worksheet = LD & LHD Vehicle FYE 15	• # Years Effectiveness	• Not to exceed 5 years.
	• Unit # / ID	• List each vehicle separately.
	• Incremental Cost	• For new vehicles, must be based on two quotes—one for the new alt-fuel vehicle, and one for a new conventionally-fueled equivalent model that meets current emission standards.
	• Current Standard and New Vehicle Standard • Cost-Effectiveness	• Enter in Columns E and F the standard that a vehicle is certified to, as shown on the CARB Executive Order. • Column U, automatically calculated. Each vehicle must meet the Policy requirements for cost-effectiveness.