Appendix H: Instructions for Cost-Effectiveness Worksheets

Cost-Effectiveness Worksheets are used to calculate project emission reductions and TFCA cost-effectiveness (TFCA $/ton of emission reductions). County Program Managers must submit Cost-Effectiveness Worksheets for each new project and each project receiving additional TFCA funds, along with Project Information Forms, no later than six months after Air District Board approval of the County Program Manager's Expenditure Plan. County Program Managers must also submit Worksheets with Final Report Forms as follows:

- **For projects that provide a service** (e.g., ridesharing, shuttle, bike share projects), post-project evaluations should be completed using the Cost-Effectiveness Worksheet version from the ***year* service was available to the public**. (This version may be the same as the one used in the pre-project evaluation).
- **For all other projects**, post-project evaluations should be completed using the version of the Cost-Effectiveness Worksheet for the year the purchased, installed, or constructed project became available for use by the public.

The Air District provides Microsoft Excel worksheets for download on their Box account (link is provided via email to the County Program Managers). Worksheets must be completed for all project types with the exception of TFCA County Program Manager administrative costs.

Project Type	**Worksheet Name**
Ridesharing, Shuttles, Bicycle, Bike Share, Smart Growth, and Traffic Calming Projects	Trip Reduction FYE 2020
Arterial Management: Signal Timing	Arterial Management FYE 2020
Transit Bus Signal Priority (also for Transit Rail Vehicles)	Trip Reduction FYE 2020
Alternative-Fuel Light-Duty and Light Heavy-Duty Vehicles or Infrastructure	LD & LHD Vehicle FYE 2020
Alternative-Fuel Low-Mileage Utility Trucks – Idling Service	Heavy-Duty Vehicle FYE 2020
Alternative-Fuel Heavy-Duty Vehicles, Buses, or Infrastructure	Heavy-Duty Vehicle FYE 2020
Electric Vehicle Charging Stations	EV Infrastructure FYE 2020

Make entries in the yellow-shaded areas only in the worksheets. Begin each new filename with the application number (e.g., 20MAR04) as described below. Each worksheet contains separate tabs for: Instructions (no user input), General Information, Calculations, Notes and Assumptions, and Emission Factors (no user input).

County Program Managers must provide all relevant assumptions used to determine the project's cost-effectiveness in the Notes & Assumptions tab. If a County Program Manager seeks to use different default values or methodologies, it is advisable that they consult with the Air District before project approval, in order to avoid the risk of funding projects that are not eligible for TFCA funds.

The Air District encourages County Program Managers to assign the shortest duration possible for the # Years of Effectiveness value for a project to meet the cost-effectiveness requirement. This practice will help to minimize both the Grantee and County Program Manager's administrative burdens.

Instructions Specific to Each Project Type

Ridesharing and Shuttle Projects

Two key components in calculating cost-effectiveness is the number of vehicle trips eliminated per day and the trip length. **The number of vehicle trips eliminated is the number of trips by**

participants that would have driven as a single occupant vehicle if not for the service; *it is not the same as the total number of riders or participants*. A frequently used proxy is the percentage of survey respondents who report that they would have driven alone if not for the service provided. For calculating the length of trip, only use the length of the vehicle trip avoided by only the riders that otherwise would have driven alone.

In addition, **each shuttle route must meet the cost-effectiveness criteria** (Policy #2). If a project consists of more than one route, one worksheet should be submitted with all routes listed, **and** a separate worksheet must be prepared showing the cost-effectiveness of each route (i.e., as determined by that route's ridership, funding allocation, etc.).

Annually funded service projects with a one-year project useful life and that do propose surplus emissions reduction may continue receiving funds.

Note that MTC's regional rideshare program (i.e., 511.org) provides funding to counties. This funding may also contain some TFCA funding, which, if used in combination with this TFCA funding, may violate Policy 11. Duplication.

Transit Signal Priority

For the length of trip, a good survey practice is to determine the length of automobile trip avoided by just those riders that otherwise would have driven, rather than by all riders.

Arterial Management Projects

Please note that each segment must meet the cost-effectiveness requirement (Policy #2). If there are multiple segments being considered for funding, one worksheet should be submitted with all segments listed, **and** a separate worksheet should be submitted showing the cost-effectiveness for each segment.

For a signal timing project to qualify for four (4) years of effectiveness, the signals must be retimed after two (2) years.

Smart Growth and Traffic Calming

Projects must reduce vehicle trips by increasing pedestrian/bicycle travel and transit use. Projects that only involve slowing automobile traffic briefly (e.g., via speed bumps) tend to not be cost-effective, as the acceleration following deceleration increases emissions.

Vehicle and Fueling Infrastructure Projects

The investment in each individual vehicle must be shown to be cost-effective (Policy #2). The worksheet calculates the cost-effectiveness of each vehicle separately, so only one worksheet is required when more than one vehicle is being considered for funding.

TFCA Policies require that all projects including those subject to emission reduction regulations, contracts, or other legally binding obligations achieve ***surplus*** emission reductions—that is, reductions that go beyond what is required. **Therefore, vehicles with engines certified as Family Emission Limit (FEL) engines are not eligible for funding because the engine is certified for participation in an averaging, banking, and trading program in which emission benefits are already claimed by the manufacturer.**

Because TFCA funds may only be used to fund early-compliance emissions reductions, and because of the various fleet rule requirements, calculating cost-effectiveness for vehicle grant projects can be complex, and it is recommended that it be done only by someone familiar with all applicable

regulations and certifications. Additionally, electric vehicle infrastructure generally does not qualify for more than $3,000 per single-port Level 2 (6.6KW) charging station, $4,000 per dual-port Level 2 charging station, and $18,000 per DC fast charging station; County Program Managers should consult with the Air District on such projects, as the evaluation methodologies are evolving. Also, any questions should be raised to Air District staff well before project approval deadlines in order to assure project eligibility. Below is general guidance for charging type based on the duration the vehicle is parked at that specific location:

Category	Typical Venues	Available Charging Time	Charging Method (Primary/Secondary)
Opportunity and Destination	• Shopping Centers • Airport (short term parking) • Other • Cultural and Sports Centers • Parking Garages • Hotels/Recreation Sites • Airports (long term parking)	0.5 – 2 hours < 1 hour < 1 hour 2 – 5 hours 2 – 10 hours 4 – 72 hours 8 – 72+ hours	Level 2/DC Fast Level 2/DC Fast Level 2/DC Fast Level 2/Level 1 Level 2/Level 1 Level 2/Level 1 Level 1/Level 2
Corridor/Pathway	• Interstate Highways • Commuting/Recreation Roads	< 0.5 hours < 0.5 hours	DC Fast/ DC Fast/Level 2
Emergency	• Fixed • Mobile	< 0.1 hours < 1 hour	DC Fast Level 2/DC Fast

For more information, please refer to the Bay Area EV Readiness Plan.

The cost-effectiveness of fueling infrastructure is based on the vehicles that will use the funded facility. For these projects, County Program Managers must exercise care that emission reductions from the associated vehicles are only credited towards a TFCA infrastructure project, and are not double counted in any other Air District grant program, either at the present time or for future vehicles that will use the facility during its years effectiveness.

The total mileage a vehicle can travel may be limited by regulation, and the product of Years of Effectiveness and Average Annual Miles cannot exceed that mileage (e.g., some cities limit the lifetime miles a taxicab can travel).

Heavy-duty vehicle and infrastructure projects: The California Air Resources Board (CARB) Carl Moyer Program Guidelines document is the source for the formulas and factors used in the Heavy-Duty Vehicle worksheet. The full documentation is available Note that there are some differences between the TFCA and Moyer programs; consult Air District staff with any questions. At a minimum, a funded vehicle must have an engine complying with the model year 2010 and later emission standards. Vehicles that are funded by the TFCA shall not be co-funded with other funding sources that claim emissions credits. At this time, vehicles that are funded by the CARB (e.g., Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project [HVIP]), Carl Moyer, or other Air District grant programs are not eligible for additional funding from TFCA.

Documentation and Recordkeeping: Beginning in FYE 2012, Project files must be maintained by County Program Managers and Grantees for a minimum of *five years* following completion of the Project Years Effectiveness, versus three years as before. Project files must contain all related documentation including copies of CARB executive orders, quotes, mileage logs, fuel usage (if cost-effectiveness is based on fuel use), photographs of engines and frames that were required to be scrapped, and financial records, in order to document the funding of eligible and cost-effective projects.

Guidance on inputs for the worksheets are as follows:

Instructions Tab

Provides instructions applicable to the relevant project type(s).

General Information Tab

Project Number, which has three parts:

1st – fiscal year in which project will be funded (e.g., 20 for FYE 2020).

2nd – County Program Manager; use the following abbreviations:

ALA – Alameda	**CC** – Contra Costa	**MAR** – Marin
NAP – Napa	**SF** – San Francisco	**SM** – San Mateo
SC – Santa Clara	**SOL** – Solano	**SON** – Sonoma

3rd – two-digit number identifying project; 00 is reserved for County Program Manager administrative costs.

Example: 20MAR04 = fiscal year ending **2020**, **Mar**in, Project #**04**.

Project Title: *Short and descriptive* title of project, matching that on the Project Information Form.

Project Type Code: Insert ***one and only one*** of the following codes for the corresponding project type. If a project has multiple parts, use the code for the main component. Note that not all listed project types may be allowed in the current funding cycle**.**

Code	Project Type	Code	Project Type
0	Administrative costs	**6c**	Shuttle services – NG powered
1a	NG buses (transit or shuttle buses)	**6d**	Shuttle services – EV powered
1b	EV buses	**6e**	Shuttle services – Fuel cell powered
1c	Hybrid buses	**6f**	Shuttle services – Hybrid vehicle
1d	Fuel cell buses	**6g**	Shuttle services – Other fuel type
1e	Buses – Alternative fuel	**6h**	Shuttle services w/TFCA purchased retrofit
2a	NG school buses	**6i**	Shuttle services – fleet uses various fuel types
2b	EV school buses	**7a**	Class 1 bicycle paths
2c	Hybrid school buses	**7b**	Class 2 bicycle lanes
2d	Fuel cell school buses	**7c**	Class 3 bicycle routes, bicycle boulevards
2e	School buses – Alternative fuel	**7d**	Bicycle lockers and cages
3a	Other heavy-duty – NG (street sweepers, garbage trucks)	**7e**	Bicycle racks
3b	Other heavy-duty – EV	**7f**	Bicycle racks on buses
3c	Other heavy-duty – Hybrid	**7g**	Attended bicycle parking (“bike station”)
3d	Other heavy-duty – Fuel cell	**7h**	Other type of bicycle project (e.g., bicycle loop detectors)
3e	Other heavy-duty - Alternative fuel (High Mileage)	**7i**	Bike share
3f	Other heavy-duty - Alternative fuel (Low Mileage)	**7j**	Class 4 cycle tracks or separated bikeways
4a	Light-duty vehicles – NG	**8a**	Signal timing (Regular projects to speed traffic)
4b	Light-duty vehicles – EV	**8b**	Arterial Management – transit vehicle priority
4c	Light-duty vehicles – Hybrid	**8c**	Bus Stop Relocation
4d	Light-duty vehicles – Fuel cell	**8d**	Traffic roundabout

Code	Project Type	Code	Project Type
4e	Light-duty vehicles – Other clean fuel	**9a**	Smart growth – traffic calming
5a	Implement TROs (pre-1996 projects only)	**9b**	Smart growth – pedestrian improvements
5b	Regional Rideshare Program	**9c**	Smart growth – other types
5c	Incentive programs (for any alternative mode)	**10a**	Rail-bus integration
5d	Guaranteed Ride Home programs	**10b**	Transit information / marketing
5e	Ridesharing – Vanpools (if cash incentive only, use 5c)	**11a**	Telecommuting demonstration
5f	Ridesharing – School carpool match	**11b**	Congestion pricing demonstration
5g	Other ridesharing / trip reduction projects	**11c**	Other demonstration project
5h	Trip reduction bicycle projects (e.g., police on bikes)	**12a**	Natural gas infrastructure
6a	Shuttle services – diesel powered	**12b**	Electric vehicle infrastructure
6b	Shuttle services – gasoline powered	**12c**	Alternative fuel infrastructure

County: Use the same abbreviations as used in Project Number.

Worksheet Calculated by: Name of person completing the worksheet.

Date of Submission: Date submitted to the County Program Manager.

Project Sponsor Organization: Organization responsible for the project.

Contact Name: Name of individual responsible for implementing the project. Include all contact information requested (email, phone, address).

Project Start Date: Date work begins on a project. Note: Project must meet Readiness Policy (Policy #6).

Project Completion Date: Date the project was completed.

Final Report to CMA: Date the Final Report was received by the County Program Manager. Note: County Program Managers must expend funds within two years of receipt, unless an application states that the project will take a longer period of time and is approved by the County Program Manager or the Air District.

Calculations Tab

Because the worksheets have many interrelated formulas and references, users must not add or delete rows or columns, or change any formulas, without consulting with the Air District. Several cells have input choices or information built in, as pull-down menus or comments in Excel. Pull-down menus are accessed by clicking on the cell. Comments are indicated by a small triangle in the upper right corner of a cell, and are made visible by resting the cursor over the cell.

Cost-Effectiveness Inputs

 # Years Effectiveness: Equivalent to the administrative period of the grant. See inputs table below. The best practice is to use shortest value possible.

Total Project Cost: Total cost of project including TFCA funding, sponsor funding, and funds contributed by other entities. Only include goods and services of which TFCA funding is an integral part.

TFCA Cost: TFCA 40% County Program Manager Funds and the 60% Regional Funds (if any), listed separately.

Emission Reduction Calculations

Instructions and default values for each project type are provided in the table below. Default values for years of effectiveness are provided for the various project types. There are no defaults for Smart Growth projects, due to the wide variability in these projects.

Notes & Assumptions Tab

Provide an explanation of all assumptions used. If you choose to use assumptions or values different from those defaults values provided in the Air District's guidelines, submit documentation and an explanation about your inputs and assumptions to request approval from the Air District prior to awarding funds to the project.

Emission Factors Tab

This tab contains references for the Calculations tab. **No changes shall be made to this tab.**

Additional Information for Heavy-duty Vehicle Projects

CARB has adopted a number of standards and fleet rules that limit funding opportunities for on-road heavy-duty vehicles. See the below list of CARB rules that affect on-road heavy-duty fleets, followed by a reference sample CARB Executive Order. For assistance in determining whether a potential project is affected, contact Air District staff or consult Carl Moyer Implementation Charts at:
http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm

Summary of On-Road Heavy-Duty Fleet Rules

Vehicle Type	Subject to CARB Fleet Rule?
Urban buses	Fleet Rule for Transit Agencies
Transit Fleet Vehicles	Fleet Rule for Transit Agencies
Solid Waste Collection Vehicles, excluding transfer trucks	Solid Waste Collection Vehicle Regulation
Municipal Vehicles and Utility Vehicles	Fleet Rule for Public Agencies and Utilities
Port and Drayage Trucks	Port Truck Regulation
All other On-road heavy-duty vehicles	On-road Rule

Summary of Maximum Cost-Effectiveness & Years Effectiveness by Project Category

Policy No.	Project Category	Maximum C-E ($/weighted ton)	Years Effectiveness
22	Alternative Fuel Light-Duty Vehicles	250,000	3 years recommended, 4 years max
23	Reserved	Reserved	Reserved
24	Alternative Fuel Heavy-Duty Vehicles and Buses	250,000	3 years recommended, 4 years max
25	On-Road Goods Movement Truck and Bus Replacements	90,000	3 years recommended, 4 years max
26	Alternative Fuel Infrastructure	250,000 500,000*	3 years recommended, 4 years max
27	Ridesharing Projects – Existing	150,000	2 years max
28.a.-h.	Shuttle/Feeder Bus Service – Existing	200,000; 250,000 for services in CARE Areas or PDAs	2 years max
29.a.	Shuttle/Feeder Bus Service – Pilot	Year 1 - 250,000 Year 2 - see Policy #28.a.-h.	2 years max
	Shuttle/Feeder Bus Service – Pilot in CARE Areas or PDAs	Years 1 & 2 - 500,000 Year 3 - see Policy #28.a.-h.	2 years max
29.b.	Pilot Trip Reduction	250,000	2 years max
30	Bicycle Projects	250,000	From 3 to 10 years
31	Bike Share	500,000	5 years max
32	Arterial Management	175,000	2 or 4 years
33	Smart Growth/Traffic Calming	175,000	10 years max

*This higher C-E limit is for projects that install charging stations at multi-dwelling units, transit stations, and park and ride lot facilities.

Emission Reduction Inputs

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
Trip Reduction Project Type = 5a-h, 8b, 9a-c 11a, or 11b Worksheet = Trip Reduction FYE 2020 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, 50% of # Trips/Day Eliminated (Step 1-Column A) • Enter in Step 2-Column B - 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, 240 days (max) • Step 1-Column C, No Default • Step 2-Column A, 50% of # Trips/Day Eliminated (Step 1-Column A) • Step 2-Column B, same as Step 1-Column B • Enter in Step 2-Column C, 3 miles
	Smart Growth / Traffic Calming	• Cost Effectiveness Inputs, 10 years max • No other 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.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
Bicycle Projects Project Type = 7a-j Worksheet = Trip Reduction FYE 2020 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 Class 4 cycle tracks or separated bikeways • # Trips/Day (1-way) eliminated (depends on length of project segment and ADT on project segment)	• Enter in Cost Effectiveness Inputs: Not to exceed 10 years for Class 1 projects (trails/paths) Not to exceed 7 years for Class 2, Class 3 and Class 4 projects • Enter in Step 1-Column A:

	Class 1 & Class 2 & Class 4 ADT ≤ 12,000 vehicles per day	Length ≤ 1 mile = 0.4% ADT Length >1 and ≤ 2 miles = 0.6% ADT Length >2 miles = 0.8% ADT
For gap closure projects (where project will close a gap between two existing segments of bikeway), use the length for the total facility.	Class 1 & Class 2 & Class 4 ADT > 12,000 and ≤ 24,000	Length ≤ 1 mile = 0.3% ADT Length > 1 and ≤ 2 miles = 0.45% ADT Length > 2 miles = 0.6% ADT
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.	Class 1 & Class 2 & Class 4 ADT > 24,000 and ≤ 30,000 Maximum is 30,000.	Length ≤ 1 mile = 0.25% ADT Length > 1 and ≤ 2 miles = 0.35% ADT Length > 2 miles = 0.45% ADT
	Class 3 bike route or bicycle boulevard	Route ≤ 1 mile = 0.1% ADT Route > 1 and ≤ 2 miles = 0.15% ADT Route > 2 miles = 0.25% ADT
	Upgraded Class 1 & Upgraded Class 4	Use 10% of the appropriate formula above
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	• Enter in Cost Effectiveness Inputs, 3 yrs
	• # Trips/Day (1-way) eliminated	• Enter in Step 1-Column A: Capacity of lockers x 2 trip/day Capacity of cages x 0.75 trips per day Capacity of racks x 0.5 trips per day
	• Days/Yr	• Enter in Step 1-Column B, 240 days
	• Trip Length (1-way)	• Enter in Step 1-Column C, 3 miles
	Bike Share	
	• # Years Effectiveness	• Enter in Cost Effectiveness Inputs, max. 5 yrs

	• # Trips/Day (1-way) eliminated	• Enter in Step 1-Column A: Number of bikes * 1.48 trips per day * 12% (actual vehicle trips replaced based on Shaheen research dated June 2015)
	Weekdays	
	• Days/Yr • Trip Length (1-way)	• Enter in Step 1-Column B, 260 days • Enter in Step 1-Column C, 16 miles
	Weekends	
	• Days/Yr • Trip Length (1-way)	• Enter in Step 1-Column B, 105 days • Enter in Step 1-Column C, 3 miles

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 2020	**<u>Shuttle/Feeder Bus, Rail-Bus Integration, and Transit Information Systems</u>**	
	• # Years Effectiveness	• Cost Effectiveness Inputs, up to 2 years
	# Trips/Day (1-way) eliminated trips. Trips only from riders who previously would have driven.	• Step 1-Column A, 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 =240 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—CARB Table 2 for vehicles model year 2004 and after, or CARB 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.	• Step 3B: Columns D through H, no default. Note that Step 3B uses Other PM_{10}, not Total PM_{10}.

	• 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.	• 3B Column I, no default.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
	Arterial Management (Signal Timing)	
Arterial Management Project Type = 8a Worksheet = Arterial Management FYE 2020	• # Years Effectiveness	• 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.
	• Name of Arterial	• Column A: Name of the arterial and the direction of travel.
	• Segment Length (miles)	• Enter under Column B the length of arterial over which speeds will be increased.
	• Days/Yr.	• Enter under Column C the number of days per year over which the project would affect traffic. Default is 240 days.
	• Time Period	• 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.
	• Traffic Volume	• 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.
	• Traffic Speed without the Project	• Enter under Column F the average traffic speed along the length of the arterial before implementation of the project.
	• Travel Speed with 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%.*

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
○ **Alternative Fuel Heavy-Duty Vehicles and Infrastructure**	○ Cost Effectiveness Inputs, # Years Effectiveness. Use separate workbook and	• 3 years is recommended - Not to exceed 4 years.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
○ Project Types = 1a, 1b, 1c, 1d, 1e, 2a, 2b, 2c, 2d, 2e, 3a, 3b, 3c, 3d, 3e, 3f, 12a, 12b, 12c ○ Worksheets = Heavy-Duty Vehicle FYE 2020 for Vehicles and EV Infrastructure FYE 2020 for Infrastructure	Project # for each set of vehicles with different # Years Effectiveness or with different fuel types.	
	○ 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 2019 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 Air District's jurisdiction can be counted.	• Column K: No default.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
	• 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 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,	• Columns L through N: For FYE 2018 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.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
	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 2020, 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 - 4 yrs max.
	• Columns AB – AG, Emission Reductions.	• Columns AB – AG. Calculated automatically. Enter zero (0) if a reduction cannot be claimed.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
	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.	
	• 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 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	• Column AS: No default.

Project Type/Worksheet Name	Input Data Needed	Default Assumptions
	(e.g., Medium Heavy Duty Diesel is 1527 g/mi).	
	• 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
Alternative Fuel Vehicles and Infrastructure: **Light-Duty and Light Heavy-Duty** Project Types = 4a, 4b, 4c, 4d, 4e, 12a, 12b, 12c, including projects that replace heavy-duty vehicles and buses with alternative fuel light-duty vehicles Worksheet = LD & LHD Vehicle FYE 2020	• # Years Effectiveness	• 3 years is recommended - 4 years max.
	• Unit # / ID	• List each vehicle separately.
	•	•
	• Current Standard and New Vehicle Standard	• Enter in Columns E and F the standard that a vehicle is certified to, as shown on the CARB Executive Order.
	• Cost-Effectiveness	• Column U, automatically calculated. Each vehicle must meet the Policy requirements for cost-effectiveness.