

## APPENDIX F

### 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 Program Manager's Expenditure Plan. The Air District provides Microsoft Excel worksheets by e-mail. Worksheets must be completed for all project types with the exception of TFCA Program Manager administrative costs.

| <u>Project Type</u>   | <u>Worksheet Name</u>  |
|---|------------------------|
| Ridesharing, Shuttles, Bicycle, Smart Growth, and Traffic Calming Projects  | Trip Reduction 10      |
| Arterial Management: Signal Timing  | Arterial Management 10 |
| Arterial Management: Transit Bus Priority <sup>2</sup>                      | Trip Reduction 10      |
| Alternative-Fuel Light-Duty and Light Heavy-Duty Vehicles or Infrastructure | LD & LHD Vehicle 10    |
| Alternative-Fuel Low-Mileage Utility Trucks – Idling Service                | Heavy-Duty Vehicle 10  |
| Alternative-Fuel Heavy-Duty Vehicles, Buses, or Infrastructure              | Heavy-Duty Vehicle 10  |

In using the worksheets, **only make entries in the yellow-shaded areas**. Begin each new filename with the application number (e.g., 10MAR04) 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).

**Program Managers must provide all relevant assumptions used to determine the project's cost-effectiveness in the Notes & Assumptions tab. If a Program Manager seeks to use different default values or methodologies, it must consult with the Air District and obtain written approval before project approval, in order to avoid the potential for inappropriately funded projects.**

#### Arterial Management Projects

Please note that each worksheet is set up to only calculate emissions based on travel on one segment, in two directions. For additional segments, use a separate sheet and Project Number.

#### Vehicle and Fueling Infrastructure Projects

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. Also, any questions should be raised to Program Manager and Air District staff well before project approval deadlines in order to assure project success.

TFCA Policies require that projects subject to emission reduction regulations, contracts, or other legally binding obligations must achieve *surplus* emission reductions—that is, reductions that go beyond what is required. For example, 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.

The cost-effectiveness of fueling infrastructure is based on the vehicles that will use the funded facility. 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 use the facility during its effective life.

**New for FY10/11:** As part of this fiscal year policies, the investment in each individual vehicle must be shown to be cost-effective. Worksheets have been changed to list each vehicle separately and to make an individual cost-effectiveness calculation to assist you in meeting this requirement.

**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 at <http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm>. Note that some differences apply between the TFCA and Moyer programs; consult with 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.

**Documentation and Recordkeeping:** Project files must be maintained by Program Managers and Project Sponsors for a minimum of three years following completion of the Final Report. 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 follows.

### ***Instructions Tab***

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

### ***General Information Tab***

**Project Number**, which has three parts:

**1<sup>st</sup>** – fiscal year in which project will be funded (e.g., 10 for FY10/11).

**2<sup>nd</sup>** – County Program Manager; use the following abbreviations:

|                         |                           |                       |
|-------------------------|---------------------------|-----------------------|
| <b>ALA</b> – Alameda    | <b>CC</b> - Contra Costa  | <b>MAR</b> – Marin    |
| <b>NAP</b> – Napa       | <b>SF</b> - San Francisco | <b>SM</b> - San Mateo |
| <b>SC</b> - Santa Clara | <b>SOL</b> – Solano       | <b>SON</b> – Sonoma   |

**3<sup>rd</sup>** – two-digit number identifying project; 00 is reserved for Program Manager admin costs.

Example: 10MAR04 = fiscal year **2010/11**, **Marin**, Project **#04**.

**Project Title:** *Short and descriptive* title of project.

**Project Type Code:** Insert one of the following codes for the corresponding project type. If none of the codes is appropriate, leave blank. Note that not all listed project types may be allowed in the current funding cycle.

| Code      | Project Type  | Code       | Project Type   |
|-----------|---|------------|--|
| <b>0</b>  | Administrative costs                                    | <b>6a</b>  | Shuttle services – diesel powered                            |
| <b>1a</b> | NG buses (transit or shuttle buses)                     | <b>6b</b>  | Shuttle services – gasoline powered                          |
| <b>1b</b> | EV buses  | <b>6c</b>  | Shuttle services – NG powered                                |
| <b>1c</b> | Hybrid buses  | <b>6d</b>  | Shuttle services – EV powered                                |
| <b>1d</b> | Fuel cell buses   | <b>6e</b>  | Shuttle services – Fuel cell powered                         |
| <b>1e</b> | Buses – Alternative fuel                                | <b>6f</b>  | Shuttle services – Hybrid vehicle                            |
| <b>2a</b> | NG school buses   | <b>6g</b>  | Shuttle services – Other fuel type                           |
| <b>2b</b> | EV school buses   | <b>7a</b>  | Class 1 bicycle paths  |
| <b>2c</b> | Hybrid school buses                                     | <b>7b</b>  | Class 2 bicycle lanes  |
| <b>2d</b> | Fuel cell school buses                                  | <b>7c</b>  | Class 3 bicycle routes                                       |
| <b>2e</b> | School buses – Alternative fuel                         | <b>7d</b>  | Bicycle lockers  |
| <b>3a</b> | Other heavy-duty – NG (street sweepers, garbage trucks) | <b>7e</b>  | Bicycle racks  |
| <b>3b</b> | Other heavy-duty – EV                                   | <b>7f</b>  | Bicycle racks on buses                                       |
| <b>3c</b> | Other heavy-duty – Hybrid                               | <b>7g</b>  | Attended bicycle parking (“bike station”)                    |
| <b>3d</b> | Other heavy-duty – Fuel cell                            | <b>7h</b>  | Other type of bicycle project (e.g., bicycle loop detectors) |
| <b>3e</b> | Other heavy-duty - Alternative fuel (High Mileage)      | <b>8a</b>  | Signal timing (Regular projects to speed traffic)            |
| <b>3f</b> | Other heavy-duty - Alternative fuel (Low Mileage)       | <b>8b</b>  | Arterial Management – transit bus priority                   |
| <b>4a</b> | Light-duty vehicles – NG                                | <b>9a</b>  | Smart growth – traffic calming                               |
| <b>4b</b> | Light-duty vehicles – EV                                | <b>9b</b>  | Smart growth – pedestrian improvements                       |
| <b>4c</b> | Light-duty vehicles – Hybrid                            | <b>9c</b>  | Smart growth – other types                                   |
| <b>4d</b> | Light-duty vehicles – Fuel cell                         | <b>10a</b> | Rail-bus integration   |
| <b>4e</b> | Light-duty vehicles – Other clean fuel                  | <b>10b</b> | Transit information / marketing                              |
| <b>4f</b> | Light-duty vehicles – Alternative fuel (SULEV)          | <b>11a</b> | Telecommuting demonstration                                  |
| <b>4g</b> | Light-duty vehicles – Alternative fuel (PZEV)           | <b>11b</b> | Congestion pricing demonstration                             |
| <b>4h</b> | Light-duty vehicles – Alternative fuel (AT-PZEV)        | <b>12a</b> | Natural gas infrastructure                                   |
| <b>4i</b> | Light-duty vehicles – Alternative fuel (ZEV)            | <b>12b</b> | Electric vehicle infrastructure                              |
| <b>5a</b> | Implement TROs (pre-1996 projects only)                 | <b>12c</b> | Alternative fuel infrastructure                              |
| <b>5b</b> | Regional Rideshare Program                              |            |  |
| <b>5c</b> | Incentive programs (for any alternative mode)           |            |  |
| <b>5d</b> | Guaranteed Ride Home programs                           |            |  |
| <b>5e</b> | Ridesharing – Vanpools (if cash incentive only, use 5c) |            |  |
| <b>5f</b> | Ridesharing – School carpool match                      |            |  |
| <b>5g</b> | Other ridesharing / trip reduction projects             |            |  |
| <b>5h</b> | Trip reduction bicycle projects (e.g., police on bikes) |            |  |

**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 Program Manager.

**Project Sponsor Org.:** 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** Project must meet Readiness Policy.

**Completion Date &  
Final Report to CMA:**

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 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.** 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:** See inputs table below.

**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.

**Emission Reduction Inputs**

| Project Type/Worksheet Name   | Input Data Needed   | Default Assumptions   |
|---|---|---|
| <p><b>Ridesharing / Trip Reduction</b><br/>                     Project Type = 5 a-h, 8b, 9 a-c, 11a, or 11b<br/>                     Worksheet = Trip Reduction 10<br/>                     Note: For ridesharing, the Air District generally assumes that the maximum number of vehicle trips reduced per day is 1% of target population.</p> | <p style="text-align: center;"><b><u>Ridesharing</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness</li> <li>• # Trips/Day (1-way) eliminated [% of target population (# employees)]</li> <li>• Days/Yr</li> <li>• Trip Length (1-way)</li> </ul>   | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs, up to 2 years</li> <li>• Enter in Step 1-Column A, 1% of target population</li> <li>• Enter in Step 1-Column B, 240 days (max.)</li> <li>• Step 1-Column C, Default = 16 miles (1-way commute distance from MTC’s Commuter Profile)</li> </ul>   |
|   | <p style="text-align: center;"><b><u>School-Based Ridesharing</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness</li> <li>• # Trips/Day (1-way) eliminated [% of target population (total # students)]</li> <li>• Days/Yr</li> <li>• Trip Length (1-way)</li> </ul>   | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs, up to 2 yrs</li> <li>• Step 1-Column A, No Default</li> <li>• Enter in Step 1-Column B, 180 days (max.)</li> <li>• Step 1-Column C, 1-3 miles</li> </ul>   |
|   | <p style="text-align: center;"><b><u>Transit Incentive Campaigns</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness</li> <li>• # Trips/Day (1-way) eliminated [% of target population]. Use survey data if available.</li> <li>• Days/Yr</li> <li>• Trip Length (1-way), based on routes accessed</li> <li>• # New Trips/Day (1-way) to access transit</li> <li>• Days/Yr (new trips)</li> <li>• Trip Length (1-way) for new trips</li> </ul> | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs, up to 2 yrs</li> <li>• Step 1-Column A, No default</li> <li>• Enter in Step 1-Column B, 90 days (max.)</li> <li>• Step 1-Column C, No Default</li> <li>• Step 2-Column A, No Default</li> <li>• Enter in Step 2 - same as # days used in Step 1</li> <li>• Step 2-Column C, Default = 3 miles</li> </ul> |
|   | <p style="text-align: center;"><b><u>Guaranteed Ride Home Programs</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness</li> <li>• # Trips/Day (1-way) eliminated</li> <li>• Days/Yr</li> <li>• Trip Length (1-way)</li> </ul>  | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs, up to 2 years</li> <li>• Enter in Step 1-Column A, 0.2% of target population.</li> <li>• Enter in Step 1-Column B, 240 days (Max.)</li> <li>• Step 1-Column C, Default = 16 miles</li> </ul>   |
|   | <p style="text-align: center;"><b><u>Transit Bus Signal Prioritization</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness</li> <li>• # Trips/Day (1-way) eliminated</li> <li>• Days/Yr</li> <li>• Trip Length (1-way)</li> </ul>  | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs, 2 yrs</li> <li>• Step 1-Column A, No Default</li> <li>• Enter in Step 1-Column B, 250 days (max)</li> <li>• Step 1-Column C, No Default</li> </ul>   |

**Emission Reduction Inputs**

| Project Type/Worksheet Name   | Input Data Needed  | Default Assumptions   |
|---|--|---|
| <p><b>Bicycle Projects</b><br/>                     Project Type = 7a -h<br/>                     Worksheet = Trip Reduction 10<br/>                     Methodology to estimate number of trips reduced for bike paths, lanes, &amp; routes based on:<br/>                     - the type of facility (Class 1, 2, or 3)<br/>                     - the length of the project segment<br/>                     - the traffic volume (ADT) on the facility.<br/>                     For Class 1 projects, use the ADT on the most appropriate parallel road.</p> <p>For gap closure projects (where project will close a gap between two existing segments of bikeway), use the length for the total facility.</p> <p>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.</p> <p>The Air District normally uses an average trip length of 3 miles (one-way) for bicycle projects.</p> | <p><b><u>Bicycle Projects (Paths, Lanes, Routes)</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness                             <ul style="list-style-type: none"> <li>Class 1 bike path (or bike bridge)</li> <li>Class 2 bike lane</li> <li>Class 3 bike route</li> </ul> </li> <li>• # Trips/Day (1-way) eliminated (depends on length of project segment and ADT on project segment)                             <ul style="list-style-type: none"> <li>Class 1 bike path &amp; Class 2 bike lane<br/>ADT &lt; 12,000 vehicles per day</li> <li>Class 1 bike path &amp; Class 2 bike lane<br/>ADT &gt; 12,000 and &lt; 24,000</li> <li>Class 1 bike path w/ADT = 24,000 +<br/>Class 2 bike lane w/ ADT = 24,000 +</li> <li>Class 3 bike route</li> </ul> </li> <li>• Days/Yr</li> <li>• Trip Length (1-way)</li> </ul> | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs:<br/>                             20 years for Class 1 projects (trails/paths)<br/>                             15 years for Class 2 &amp; Class 3 projects</li> <li>• Enter in Step 1-Column A:<br/><br/>                             Length &lt; 1 mile = 0.4% ADT<br/>                             Length &gt;1 and &lt;2 miles = 0.6% ADT<br/>                             Length &gt;2 miles = 0.8% ADT<br/><br/>                             Length &lt; 1 mile = 0.3% ADT<br/>                             Length &gt;1 and &lt;2 miles = 0.45% ADT<br/>                             Length &gt;2 miles = 0.6% ADT<br/><br/>                             Length &lt; 1 mile = 0.25% ADT<br/>                             Length &gt;1 and &lt;2 miles = 0.35% ADT<br/>                             Length &gt;2 miles = 0.45% ADT<br/><br/>                             Route &lt; 1 mile = 0.1% ADT<br/>                             Route &gt;1 and &lt;2 miles = 0.15% ADT<br/>                             Route &gt;2 miles = 0.25% ADT</li> <li>• Enter in Step 1-Column B, 240 days</li> <li>• Enter in Step 1-Column C, 3 miles</li> </ul> |
|   | <p><b><u>Bicycle Lockers &amp; Racks</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness</li> <li>• # Trips/Day (1-way) eliminated</li> <li>• Days/Yr</li> <li>• Trip Length (1-way)</li> </ul>   | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs, 10 yrs</li> <li>• Enter in Step 1-Column A:<br/>                             Capacity of lockers x 1 trip/day<br/>                             Capacity of racks x 0.5 trips per day</li> <li>• Enter in Step 1-Column B, 240 days</li> <li>• Enter in Step 1-Column C, 3 miles</li> </ul>   |

Emission Reduction Inputs

| Project Type/Worksheet Name  | Input Data Needed   | Default Assumptions   |
|--|---|---|
| <p><b>Shuttles / Rail-Bus Integration / Transit Info</b><br/>                     Project Type =6a - g, 10a, or 10b<br/>                     Worksheet = Trip Reduction 10</p> <p><i>Step 2 calculates emissions from new trips generated.</i></p> <p><i>For vans and shuttle vehicles 14,000 lbs. and lighter, use Step 3A.</i></p> | <p><b><u>Shuttle/Feeder Bus, Rail-Bus Integration, and Transit Information Systems</u></b></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness<br/>                             # Trips/Day (1-way) eliminated trips. Trips only from riders who previously would have driven.</li> <li>• Days/Yr eliminated trips</li> <li>• 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.</li> <li>• # Trips/Day (1-way) new trips to access transit</li> <li>• Days/Yr new trips</li> <li>• Trip Length (1-way) new trips. Average trip length of shuttle passengers that drive from home to the BART/Caltrain station.</li> <li>• # Vehicles, Model Year: Number of vehicles with same model year</li> <li>• Emission Std.: Emission Standard from list provided.</li> <li>• Vehicle GVW: Weight Class from list provided.</li> <li>• ROG, NOx, Exhaust PM10, and Total PM10 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.</li> <li>• CO2 Factor: enter factor from CO2 Table for Light-Duty Shuttles, on Emission Factors tab.</li> </ul> | <ul style="list-style-type: none"> <li>• Cost Effectiveness Inputs, up to 2 years</li> <li>• Step 1-Column A,<br/>                             For on-going service, use survey results<br/>                             For new service, use 50% of projected ridership</li> <li>• 1-Column B, Enter number of operating days. Default =254 days/yr.</li> <li>• Enter in Step 1-Column C, a survey-based distance, or, if no survey, 16 miles for shuttles and 35 miles for vanpools</li> <li>• Step 2-Column A, Use survey data or, if none, a default is 50% of # Trips/Day Eliminated (Step 1-Column A)</li> <li>• Enter in Step 2-Column B, same # as in Step 1-Column B.</li> <li>• Enter in Step 2-Column C, a survey-based distance, or, if no survey, default is 3 miles for home-to-rail trips</li> <li>• Step 3A - Column A, no default.</li> <li>• 3A - Column B, no default.</li> <li>• 3A Column C, no default.</li> <li>• 3A Column D through G, no default</li> <li>• 3A Column H, no default.</li> </ul> |

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|  |   |  |
|--|---|--|
| <p><i>For buses, use Step 3B.<br/>If a vehicle is unusual and does not fit the factors provided, Program Manager should consult with Air District staff.</i></p> | <ul style="list-style-type: none"> <li>• 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.</li> <li>• ROG, NOx, Exhaust PM10, Other PM10 and CO2 Factors: enter factor from Emissions for Buses Table provided on Emission Factors tab.</li> <li>• 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.</li> </ul> | <ul style="list-style-type: none"> <li>• 3A Column I, no default.</li> <li>• Step 3B: Columns D through H, no default. Note that Step 3B uses Other PM10, not Total PM10.</li> <li>• 3B Column I, no default.</li> </ul> |
|--|---|--|

| Project Type/Worksheet Name  | Input Data Needed  | Default Assumptions  |
|--|--|--|
| <p><b>Arterial Management</b><br/>Project Type = 8a<br/>Worksheet = Arterial Management 10</p> | <p><u>Arterial Management</u></p> <ul style="list-style-type: none"> <li>• # Years Effectiveness</li> <li>• Name of Arterial</li> <li>• Segment Length (miles)</li> <li>• Days/Yr.</li> <li>• Time Period</li> <li>• Traffic Volume</li> <li>• Traffic Speed w/o the Project</li> <li>• Travel Speed w/ Project</li> </ul> | <ul style="list-style-type: none"> <li>• Enter in Cost Effectiveness Inputs:<br/>For signal timing/synchronization, 2 yrs or, with retiming at 2 yrs, 4 yrs</li> <li>• Column A: Name of the arterial and the direction of travel.</li> <li>• Enter under Column B the length of arterial over which speeds will be increased.</li> <li>• Enter under Column C the number of days per year over which the project would affect traffic. Default is 250 days.</li> <li>• 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.</li> <li>• Enter under Column E the traffic volume before implementation of the project for the corresponding Time Period and direction of travel.</li> <li>• Enter under Column F the average traffic speed along the length of the arterial before implementation of the project.</li> <li>• Enter under Column G the average estimated traffic speed along the length of the arterial after implementation of the project. <i>Note: Maximum increase in speed is 25%.</i></li> </ul> |
| <p><b>Smart Growth</b></p>   | <p><u>Smart Growth / Traffic Calming</u></p>   | <p>No default assumptions for “smart growth” or traffic calming projects.</p>  |

### 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 10

| Input Data Needed  | Default Assumptions  |
|--|--|
| <ul style="list-style-type: none"> <li>• Cost Effectiveness Inputs, # Years Effectiveness. Use separate workbook and Project # for each set of vehicles with different # Years Effectiveness.</li> </ul>   | <ul style="list-style-type: none"> <li>• Enter 7 yrs max.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Column B, Unit #: A unique identifier. List each vehicle on a separate row.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column B: No default</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Columns C through E, Baseline Emission Rate: NOx, ROG, PM factors: See Moyer Table B-4, B-5, or B-6, based on your vehicle type, weight, and engine model year.</li> </ul>  | <ul style="list-style-type: none"> <li>• Columns C through E: For FY10/11 alt-fuel heavy-duty vehicle projects, including urban buses, the baseline default is the Model Year 2007 emission factor. Some exceptions apply.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Column F, Annual Fuel Use: Base on average fuel use over 2 years, and document with 2 years of records.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column F: No default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Column G, Fuel Consumption Factor: Moyer Table B-25</li> </ul>  | <ul style="list-style-type: none"> <li>• Column G: Most on-road engines are below 750 horsepower, thus the default value is 18.5.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• 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 B-8.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column H: No default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Column I, Annual VMT: Base on average VMT over 2 years, and document with 2 years of mileage records.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column I: No default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• 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 B-8.</li> </ul>   | <ul style="list-style-type: none"> <li>• Column J: No default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• 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.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column K: No default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Columns L through N, New Emission Rate: NOx, ROG, and PM: For alternative-fuel vehicles, use Moyer Table B-3 or, for CNG buses, Moyer Table B-7, based on vehicle type and engine model year. For diesel hybrid utility vehicles, use Tables B-4 or B-5 and enter Fuel Efficiency Benefit into Column Q.</li> </ul> <p>Note: FEL engines are not eligible for TFCA funding.</p> <p>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</p> | <ul style="list-style-type: none"> <li>• Columns L through N: For FY10/11 heavy-duty vehicle projects, including urban buses, the new vehicle must be certified to meet the Model Year 2010 standard of 0.2 g/bhp-hr of NOx and 0.01 g/bhp-hr of PM, which are the default values. Some exceptions apply.</li> </ul> |

**County Program Manager Fund Expenditure Plan Guidance FY 2010/11**

| Input Data Needed  | Default Assumptions  |
|--|--|
| <p>measured during the actual certification test procedure. For the purpose of the TFCA Program, the certification emission <b>standards</b> 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 (NO<sub>x</sub>+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.</p> <p>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&amp;T) program. AB&amp;T engines (i.e., all FEL-certified engines) <b>are not eligible</b> 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.</p> |  |
| <ul style="list-style-type: none"> <li>• Column O, Replacement Vehicle Cost: Must be supported by a quote for the new alt-fuel vehicle that exceeds standards.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column O: No Default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Column P, Must be supported by a quote for a new vehicle that meets but does not exceed standards (for FY10/11, the Model Year 2007 Standards).</li> </ul>  | <ul style="list-style-type: none"> <li>• Column P: No Default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Column Q, Fuel Efficiency Benefit: The percentage of fuel used in a replacement hybrid vehicle as a percentage of fuel used by baseline vehicle. E.g., for a hybrid that yields a 10% fuel use reduction, enter 90%. Must be documented by a government agency, an independent testing organization, or the manufacturer.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column Q: Default value is 100%. Minimum value is 80%, unless the Program Manager or Air District approves a different value in writing.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Column R, Fuel Consumption Factor: Use Moyer Table B-25.</li> </ul>   | <ul style="list-style-type: none"> <li>• Column R: Most on-road engines are below 750 horsepower.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• 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 <b>or</b> Column T, not both. Use Moyer Table B-8.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column S: No default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Column T, Conversion Factor (g/bhp-hr to g/mi): Enter a value <b>only if</b> 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 B-8.</li> </ul>  | <ul style="list-style-type: none"> <li>• Column T: No default.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Column Y, # Years Effectiveness: Same as in Cost Effectiveness Inputs.</li> </ul>   | <ul style="list-style-type: none"> <li>• Column Y: 7 yrs max.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Column Z, Incremental Cost: The cost of the proposed vehicle minus the baseline vehicle.</li> </ul>   | <ul style="list-style-type: none"> <li>• Column Z: Automatically calculated.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Columns AB – AG, Emission Reductions.<br/>All reductions must be surplus to any regulatory, contractual, or other legally binding requirement.<br/>Note that if ROG values are not available for both the baseline and the proposed engine, ensure</li> </ul>   | <ul style="list-style-type: none"> <li>• Columns AB – AG. Calculated automatically. Enter zero (0) if a reduction cannot be claimed.</li> </ul>  |

**County Program Manager Fund Expenditure Plan Guidance FY 2010/11**

| Input Data Needed  | Default Assumptions  |
|--|--|
| value is zero (0) for ROG, as no ROG emission reductions can be claimed.   |  |
| <ul style="list-style-type: none"> <li>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.</li> </ul>  | <ul style="list-style-type: none"> <li>Column AM: Cannot exceed Incremental Cost.</li> </ul> |
| <ul style="list-style-type: none"> <li>Column AP, Actual Weighted CE w/o CRF--Miles Basis (\$/ton). Cost-effectiveness based on emissions including weighted PM. <b>Must meet Policy Requirements.</b></li> </ul>  | <ul style="list-style-type: none"> <li>Column AP: Calculated automatically.</li> </ul>       |
| <ul style="list-style-type: none"> <li>Column AQ, Actual Weighted Contract CE w/o CRF--Fuel Basis (\$/ton). Cost-effectiveness based on emissions including weighted PM. <b>Must meet Policy Requirements.</b><br/>Emissions and cost-effectiveness calculations <b>can only be based on fuel usage for the following vehicles:</b> <ul style="list-style-type: none"> <li>Utility vehicles in idling service</li> <li>Street sweepers</li> <li>Solid waste collection vehicles.</li> </ul>                     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).                 </li> </ul> | <ul style="list-style-type: none"> <li>Column AQ: Calculated automatically.</li> </ul>       |
| <ul style="list-style-type: none"> <li>Column AS, Baseline CO2 Factor Based on Mileage: Enter value from CO2 Emission Factors Table for your fuel and vehicle type (e.g., Medium Heavy Duty Diesel is 1527 g/mi).</li> </ul>   | <ul style="list-style-type: none"> <li>Column AS: No default.</li> </ul>                     |
| <ul style="list-style-type: none"> <li>Column AT, Proposed Engine CO2 Factor Based on Mileage: Enter value from CO2 Emission Factors Table for your fuel and vehicle type (e.g., Medium Heavy Duty CNG 1098 g/mi).</li> </ul>  | <ul style="list-style-type: none"> <li>Column AT: No default.</li> </ul>                     |
| <ul style="list-style-type: none"> <li>Column AV, Baseline CO2 Factor Based on Fuel Use: Enter value from CO2 Emission Factors Table for your fuel type (e.g., Diesel is 10079 g/mi).</li> </ul>   | <ul style="list-style-type: none"> <li>Column AV: 10079 g/mi.</li> </ul>                     |
| <ul style="list-style-type: none"> <li>Column AW, Proposed Engine CO2 Factor Based on Fuel Use: Enter value from CO2 Emission Factors Table for your fuel type (e.g., CNG is 7244 g/mi).</li> </ul>  | <ul style="list-style-type: none"> <li>Column AW: No default.</li> </ul>                     |

| Project Type/Worksheet Name  | Input Data Needed   | Default Assumptions   |
|--|---|---|
| <b>Alt-fuel Vehicles and Infrastructure:<br/>Light-Duty and Light Heavy-Duty</b><br>Project Types = 4a, 4b, 4c, 4d, 4e, 12a, 12b, 12c<br>Worksheet = LD & LHD Vehicle 10 | <ul style="list-style-type: none"> <li># Years Effectiveness</li> </ul> | <ul style="list-style-type: none"> <li>Enter in Cost Effectiveness Inputs: 5 years</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>Unit # / ID</li> </ul>           | <ul style="list-style-type: none"> <li>List each vehicle separately.</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>Incremental Cost</li> </ul>      | <ul style="list-style-type: none"> <li>For new vehicles, must be based on two quotes—one for the new alt-fuel vehicle, and one for a new conventionally-fueled</li> </ul> |

**County Program Manager Fund Expenditure Plan Guidance FY 2010/11**

| Project Type/Worksheet Name | Input Data Needed  | Default Assumptions   |
|-----------------------------|--|---|
|                             |  | counterpart that meets but does not exceed current emission standards.  |
|                             | <ul style="list-style-type: none"> <li>• Current Standard and New Vehicle Standard</li> <li>• Fuel Efficiency Benefit</li> </ul> | <ul style="list-style-type: none"> <li>• Enter in Columns E and F the standard that a vehicle is certified to, as shown on the CARB Executive Order.</li> <li>• Column H. Hybrid-electric vehicles and CARB-compliant vehicle retrofits (e.g., plug-in hybrid retrofits) can achieve surplus emission reductions due to reduced fuel usage. Enter the resulting, lower percentage of fuel usage; e.g., if there is a 20% reduction, enter 80%. The difference in fuel efficiency between the resulting hybrid vehicle and the non-hybrid or non-retrofitted vehicle must be documented in order for the fuel efficiency factor to be used.</li> </ul> |
|                             | <ul style="list-style-type: none"> <li>• Cost-Effectiveness</li> </ul>   | <ul style="list-style-type: none"> <li>• Column V, automatically calculated. Each vehicle must meet the Policy requirements for cost-effectiveness.</li> </ul>  |

**Notes & Assumptions Tab**

Provide an explanation of all assumptions used. If you do not use the Air District’s guidelines and default values to determine cost-effectiveness, you must document and explain your inputs and assumptions after receiving written approval from the Air District.

**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 many standards and fleet rules that affect on-road heavy-duty diesel-fueled vehicles. Funding opportunities for vehicles subject to these rules are limited. See the below list of CARB rules that affect on-road heavy-duty fleets, followed by a reference sample CARB Executive Order.

**Summary of On-Road Heavy-Duty Fleet Rules**

| <b>Vehicle Type</b>  | <b>Subject to CARB Fleet Rule?</b>           |
|--|--|
| 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                                 |

A fleet’s compliance status with the CARB regulation must be determined. Contact Air District staff or consult fleet rule Carl Moyer Implementation Charts at:

<http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm> for assistance.

Sample CARB Executive Order for Heavy-Duty On-Road Engines

|   |                     |   |
|---|---------------------|---|
|  <b>California Environmental Protection Agency</b><br><b>AIR RESOURCES BOARD</b> | <b>CUMMINS INC.</b> | <b>EXECUTIVE ORDER A-021-0340</b><br>New On-Road Heavy-Duty Engines |
|---|---------------------|---|

Pursuant to the authority vested in the Air Resources Board (ARB) by Health and Safety Code (HSC) Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by HSC Sections 39515 and 39516 and Executive Order (EO) G-02-003; and

Pursuant to the December 15, 1998 Settlement Agreement (SA) between ARB and the manufacturer, and any modifications thereof to the Settlement Agreement;

**IT IS ORDERED AND RESOLVED:** That the engine and emission control systems produced by the manufacturer are certified as described below for use in on-road motor vehicles with a manufacturer's GVWR over 14,000 pounds. Production engines shall be in all material respects the same as those for which certification is granted.

| MODEL YEAR   | ENGINE FAMILY | ENGINE SIZE (liter)  | FUEL TYPE<br>(CNG/LNG=compressed/liquefied natural gas;<br>LPG=liquefied petroleum gas) | STANDARDS & TEST PROCEDURE | INTENDED SERVICE CLASS<br>(L/M/H HDD=light/medium/heavy heavy-duty<br>[HD] diesel; UB=urban bus; HDO=HD Otto) |
|--|---------------|--|---|----------------------------|---|
| 2003   | 3CEXH0505CBK  | 8.3  | CNG / LNG   | Diesel                     | UB  |
| <b>SPECIAL FEATURES &amp; EMISSION CONTROL SYSTEMS</b>   |               | <b>ENGINE MODELS / CODES (rated power in horsepower, hp)</b>                                   |   |                            |   |
| TBI, OC, HO2S, TC, CAC, PCM  |               | CG-280 / 8012 (280 hp), CG-275 / 8009 (275 hp), CG-250 / 8006 (250 hp), CG-250 / 8003 (250 hp) |   |                            |   |
| <small>GVWR=gross vehicle weight rating TWC/OC=three-way/oxidizing catalyst WU (prefix) =warm-up cat. O2S=oxygen sensor HO2S=heated O2S TBI=throttle body fuel injection MPI=multi port fuel injection SFI=sequential/MFI DDWDI=direct/indirect diesel injection TC/SC=turbo/super charger CAC=charge air cooler EGR=exhaust gas recirculation AIR=secondary air injection PAIR=pulsed AIR SPL=smoke puff limiter ECM/PCM=engine/powertrain control module EM=engine modification 2 (prefix)=parallel (2) (suffix)=in series HC=hydrocarbon NMHC=non-methane HC NOx=oxides of nitrogen CO=carbon monoxide PM=particulate matter HCHO=formaldehyde g/bhp-hr=grams per brake horsepower-hour</small> |               |  |   |                            |   |

The following are the exhaust emission standards (STD), or family emission limit(s) (FEL) as applicable, and certification levels (CERT) for this engine family under the "Federal Test Procedure" (FTP) (Title 13, California Code of Regulations, (13 CCR) Section 1956.1 (urban bus) or 1956.8 (other than urban bus)), and under the "Euro III Test Procedure" (EURO) in the Settlement Agreement, including EURO's "Not-to-Exceed" standard(s). "Diesel" CO certification compliance may have been demonstrated pursuant to Code of Federal Regulations, Title 40, Part 86, Subpart A, Section 86.091-23(c)(2)(i) in lieu of testing. (For flexible- and dual-fueled engines, the CERT values in brackets [ ] are those when tested on conventional test fuel. For multi-fueled engines, the STD and CERT values for default operation permitted in 13 CCR Section 1956.1 or 1956.8 are in parentheses.)

| * = not applicable | EURO'S NOT-TO-EXCEED STD |      |      |      |     |      |          |      |      |      |      |       |      |      |
|--------------------|--------------------------|------|------|------|-----|------|----------|------|------|------|------|-------|------|------|
|                    | HC                       |      | NMHC |      | NOx |      | NMHC+NOx |      | CO   |      | PM   |       | HCHO |      |
|                    | FTP                      | EURO | FTP  | EURO | FTP | EURO | FTP      | EURO | FTP  | EURO | FTP  | EURO  | FTP  | EURO |
| (DIRECT) STD       | *                        | *    | *    | *    | *   | *    | 1.8      | 1.8  | 15.5 | 15.5 | 0.03 | 0.03  | *    | *    |
| AVERAGE STD        | *                        | *    | *    | *    | *   | *    | *        | *    | *    | *    | *    | *     | *    | *    |
| FEL                | *                        | *    | *    | *    | *   | *    | *        | *    | *    | *    | *    | *     | *    | *    |
| CERT               | *                        | *    | *    | *    | *   | *    | 1.7      | 1.4  | 2.0  | 1.3  | 0.01 | 0.005 | *    | *    |

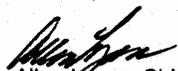
**BE IT FURTHER RESOLVED:** That certification to the FEL(s) listed above, as applicable, is subject to the following terms, limitations and conditions. The FEL(s) is the emission level declared by the manufacturer and serves in lieu of an emission standard for certification purposes in any averaging, banking, or trading (ABT) programs. It will be used for determining compliance of any engine in this family and compliance with such ABT programs.

**BE IT FURTHER RESOLVED:** That the listed engine models have been certified to the FTP optional NOx, or NMHC+NOx as applicable, and PM emission standard(s) listed above pursuant to 13 CCR Section 1956.1 or 1956.8.

**BE IT FURTHER RESOLVED:** That for the listed engine models, the manufacturer has submitted the materials to demonstrate certification compliance with 13 CCR Sections 1965 (emission control labels), and 2035 et seq. (emission control warranty).

**BE IT FURTHER RESOLVED:** That the listed engine models are conditionally certified subject to the following conditions: (1) The SA is in effect; (2) The manufacturer is in compliance with all applicable California emission regulations, and all SA's applicable requirements and any modifications thereof; (3) This EO is void with respect to any engine within this family determined to have a defeat device as that term is defined in the test procedures and SA. Any engine produced under the voided EO remains subject to stipulated penalties under the SA. Such penalties would begin to accrue upon manufacture of the first engine under this EO; (4) This EO expires at midnight on December 31, 2002; (5) Production of any engine within this family under this EO is acceptance of all conditions in this EO; and (6) ARB reserves the right to disapprove certification of this family, or any families using the same or similar auxiliary emission control device (AECD) strategies as this family is employing, based on all available information.

The Bureau of Automotive Repair will be notified by copy of this Executive Order.  
 Executed at El Monte, California on this 2nd day of October 2002.

  
 Allen Lyons, Chief  
 Mobile Source Operations Division