Appendix Q

Supporting Documents for SIP Creditability

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Appendix Q: Supporting Documents for SIP Creditability

Q.1 RESOLUTION FOR ENHANCING SIP CREDITABILITY OF INCENTIVE REDUCTIONS

The resolution is available on the District website (www.valleyair.org).

Q.2 SAMPLE EMISSION REDUCTION CALCULATIONS USED IN PROTOCOLS

The SJVAPCD Emission Reduction Incentive Program uses California Air Resources Board (ARB) guidance to develop calculations of emission reductions and cost effectiveness of various projects. ARB guidance can be found at http://www.arb.ca.gov/planning/tsaq/mvrfp/mvrfp.htm and http://www.arb.ca.gov/msprog/moyer/moyer.htm . Below are some examples to illustrate the types of calculations that could be found in a protocol applied to a specific project. These are examples only and may not reflect current District practice for calculating incentive-based emissions reductions.

Signal Coordination ***EXAMPLE***

Traffic Signal Coordination

The City's master traffic signal controller was replaced with a new controller with expanded capacity.

This allowed 25 more intersections to be coordinated.

Inputs to Calculate Cost- Effectiveness:

Funding Dollars (Funding): $200,000

Effectiveness Period (Life): 5 years

Days of use/year (D): 250

Length of congested roadway segment (L): 7.50 miles

Traffic Volume during congested period (Congested Traffic): 38,400 trips per day

Before Speed: 28 mph

After Speed: 33 mph

Emissions Factor Inputs (From Table 4):

	Before Speed Factor		After Speed Factor	
ROG Factor	0.32	grams per mile	0.27	grams per mile
NOx Factor	1.20	"	1.16	"
PM10 Factor	0.03	"	0.03	"

Calculations:

Annual Project VMT (VMT) = (D) * (L) * (Congested Traffic)

=250 * 7.50 * 38,400 = 72,000,000 annual miles

Annual Emission Reductions (ROG, NOx, and PM10) in lbs. per year

= [(.50)*(VMT)*(Before Speed Factor - After Speed Factor)]/454 grams per lb.

ROG: [(0.50 * 72,000,000) *(0.32 – 0.27)]/454 = **3,965 lbs. per year**

NOx: [(.50 * 72,000,000) *(1.20 – 1.16)]/454 = **3,172 lbs. per year**

PM10: [(.50 * 72,000,000) * (0.03 – 0.03)]/454 = **0 lbs. per year**

Capital Recovery Factor (CRF) = $\frac{(1 + i)^n(i)}{(1 + i)^n - 1}$ = .22 *where n = project life (5 years) and i = discount rate (3%)*

(From Table 8)

Cost-Effectiveness of Funding Dollars =

(CRF * Funding)/(ROG + NOx + PM10) = [.22 * 200,000] / 7,137

= $6.16 per lb.

FOR CMAQ PROJECTS ONLY:

Once emissions reductions have been calculated, add them together (9,515 + 3,172 + 793) and convert emissions reductions to kg/day:

$\frac{\text{lbs. reduced per year}}{\text{2.2 lbs./kg * 365 days/year}} = \frac{7,137}{2.2 * 365}$ = **9 kg/day**

Bicycle Facilities *EXAMPLE*

Class 2 Bikeway Facility

The new Class 2 bike lanes are a critical link in the city bike system, allowing residents bicycle access to education, employment, shopping, and transit. Within one-quarter mile of the project, there is a college, a shopping center, a light rail station, and an office building. The project includes installation of new pavement, signage, and Class 2 bike lane striping along both sides of 1.13 miles of arterials. This is primarily a college town, with a population of 128,000.

Inputs to Calculate Cost-Effectiveness:

Funding Dollars **(Funding)**:
$48,000
Effectiveness Period **(Life)**: 15
years
Days **(D)**: 200

Average Length **(L)** of bicycle trips: 1.8 miles

Annual Average Daily Traffic **(ADT)**:
20,000
Adjustment **(A)** on ADT for auto trips replaced by bike trips from the bike facility: 0.0109
Credit **(C)** for Activity Centers near the project: 0.002

Emissions Factors (From Table 3, for a 15-year Life):

	Auto Trip End Factor	Auto VMT Factor
ROG Factor	1.210 grams/trip	0.321 grams/ mile
NOx Factor	0.533	0.397
PM10 Factor	0.015	0.219

Calculations:

Annual Auto Trip Reduced = (D) * (ADT) * (A + C)

= (200) * (20,000) * (0.0109 + 0.002)

= 51,600

Annual Auto VMT Reduced = (Auto Trips) * (L)

= (51,600) * (1.8)

= 92,880

Annual Emission Reductions (ROG, NOx and PM10) in lbs. per year

= [(Annual Auto Trips Reduced) * (Auto Trips End Factor)
+ (Annual Auto VMT Reduced) * (Auto VMT Factor)] /454

ROG: [(51,600 * 1.210) + (92,880 * 0.321)]/454 = **203 lbs. per year**

NOx: [(51,600 * 0.533) + (92,880 * 0.397)]/454 = **142 lbs. per year**

PM10: [(51,600 * 0.015) + (92,880 * 0.219)]/454 = **47 lbs. per year**

Capital Recovery Factor (CRF): = **0.08** *Where n = project life (15 years)*

$\frac{(1 + i)^n(i)}{(1 + i)^n - 1}$ *and i = discount rate (3%)*

(From Table 8)

Cost-Effectiveness of Funding Dollars: (CRF * Funding) / (ROG + NOx + PM10)

=[.08 *48,000] / [203 + 142 + 47]

= $9.79 per lb.

FOR CMAQ PROJECTS ONLY:

Once emissions reductions have been calculated, add them together (203 + 142 + 47 = 392)
and convert lbs. of emissions reductions per year to kg/day:

$\frac{\text{lbs. reduced per year}}{\text{1 kg/day}} = \frac{392}{\text{2.2 lbs./kg * 365 days/year}} = \frac{392}{2.2 * 365}$

Telecommunications *EXAMPLE*

County Probation Videophone Project

A videophone-interviewing project is implemented by the County Probation Department. Videophone equipment is installed for $40,000 at the branch probation offices and two detention centers. Videophone interviewing of 5,000 inmates per year saves 200 one-way trips per week to and from detention centers (a distance of 29 miles on average).

Inputs to calculate cost-effectiveness:

Funding Dollars (Funding):
$40,000
Effectiveness Period (Life): 5
years
One-Way Auto Trips Eliminated Per Week
(T): 200
Length (L) of Auto Trips Eliminated: 29 miles one-way
Weeks (W) = 50 weeks
New Auto Trips (New T):
0
New Auto Trip Length (New L): not
applicable

Emissions Factors for Auto Travel (From Table 3):

	Auto Trip End Factor	Auto VMT Factor
ROG Factor	1.736 grams per trip	0.479 grams per mile
NOx Factor	0.727	0.620
PM10 Factor	0.014	0.219

Note: 1-5 year emission factors are used since project life is 5 years, and "Commute" auto trip end factors are used since this project reduces commute trips.

Calculations:

Annual Auto Trips Reduced = (W)*[(T) - (New T)]
=50 * (200-0) = 10,000
Annual Auto VMT Reduced = (W)*[(T)*(L) - (New T)*(New L)]
= (50)*[(200)*(29) - 0] =
290,000

Annual Emission Reductions (ROG, NOx, and PM10)
= [(Annual Auto Trips Reduced) * (Auto Trip End Factor)
+ (Annual Auto VMT Reduced) * (Auto VMT Factor)]/454

ROG: [(10,000 * 1.736) + (290,000 * 0.479)]/454 = **344 lbs. per year**
NOx: [(10,000 * 0.727) + (290,000 * 0.620)]/454 = **412 lbs. per year**
PM10: [(10,000 * 0.014) + (290,000 * 0.219)]/454 = **140 lbs. per year**

EXAMPLE

Capital Recovery Factor(CRF)= $\frac{(1+i)^n(i)}{(1+i)^n - 1} = 0.22$ *where n= project life (5 years)*

(From Table 8) *and i = discount rate (3%)*

Cost-Effectiveness of Funding Dollars = (CRF * Funding) / (ROG + NOx + PM10)
=(0.22*40,000) / (344 + 412 + 140) = **$ 9.82 per lb.**

FOR CMAQ PROJECTS ONLY:
Once emissions reductions have been calculated, add them together (344 + 412 + 140 = 896)
and convert emissions reductions to kg/day:

$$\frac{\text{lbs. reduced per year}}{\text{2.2 lbs./kg * 365 days/year}} = \frac{896}{2.2 * 365} =$$ **1 kg/day**

Ridesharing *EXAMPLE*

County Trip Reduction Program

A county conducts a comprehensive employee trip reduction program, which includes vanpool and carpool programs, telecommuting, compressed work schedules, and guaranteed emergency transportation.

Inputs to Calculate Cost-Effectiveness:

Funding Dollars (Funding): $140,000

Effectiveness Period (Life): 1 year

One-Way Auto Trips Eliminated Per Week (T) Using Optional Method 1:

T = 2 trips/day * 5 days/week * peak period employees * [1/Baseline AVR - 1/New AVR]

where baseline AVR is 1.13, new AVR is 1.19, and there are 15,750 peak period employees.

Therefore, T = 2 trips/day * 5 days/week * 15,750 peak period employees * [1/1.13 - 1/1.19] = 6300 trips

Length (L) of Auto Trips Eliminated: 16 miles

Weeks (W) = 52 weeks

Adjustment (A): 0.7 For auto access trips to transit, vanpools, and carpools

Emissions Factors for Auto Travel (From Table 3):

	Auto Trip End Factor	Auto VMT Factor
ROG Factor	2.030 grams per trip	0.587 grams per mile
NOx Factor	0.821	0.785
PM10 Factor	0.014	0.218

Note: 1-5 year emission factors are used since project life is 1 year, and "Commute" auto trip end factors are used since this project reduces commute trips..

Calculations:

Annual Auto Trips Reduced = (W)*(T)*(A)
= 52 * 6300 * .7 =
229,320

Annual Auto VMT Reduced = (W) * (T) * (L)
=52 * 6300 * 16 miles
= 5,241,600 annual VMT reduced

Annual Emission Reductions (ROG, NOx, and PM10)

= [(Annual Auto Trips Reduced) * (Auto Trip End Factor)
+ (Annual Auto VMT Reduced) * (Auto VMT Factor)]/454

ROG: [(229,320 * 2.030) + (5,241,600 * 0.587)]/454 = **7,803 lbs. per year**

NOx: [(229,320 * 0.821) + (5,241,600 * 0.785)]/454 = **9,478 lbs. per year**

PM10: [(229,320 * 0.014) + (5,241,600 * 0.219)]/454 = **2,524 lbs. per year**

Capital Recovery Factor (CRF) = $\frac{(1 + i)^n(i)}{(1 + i)^n - 1}$ = 1.03 (From Table 8)

where n = project life (1 year) and i = discount rate (3 %)

Cost-Effectiveness of Funding Dollars = (CRF * Funding) / (ROG + NOx + PM10)
=(1.03 * 140,000) / (7,803 + 9,478 + 2,524) = $7.28 per lb.

FOR CMAQ PROJECTS ONLY:

Once emissions reductions have been calculated, add them together (7,803 + 9,478 + 2,524 = 19,804) and convert emissions reductions to kg/day:

$$\frac{\text{lbs. reduced per year}}{2.2 \text{ lbs./kg} * 365 \text{ days/year}} = \frac{19{,}804}{2.2 * 365}$$

= **251 kg/day**

Q.3 HEAVY-DUTY PROGRAM ANNUAL REPORT SAMPLE

HEAVY-DUTY PROGRAM ANNUAL REPORT

Please submit your first annual report **one-year** after placing the engine(s)/vehicle(s) into service. When returning the annual report please attach a copy of evidence of insurance for the engine/vehicle.

Date:	Project Number:	
Organization:		
Primary Contact Name:		
Street/Mailing Address:		
City:	State:	Zip Code:
Phone Number:	Fax Number:	
Email:		
PLEASE PROVIDE INFORMATION FOR EACH ENGINE/VEHICLE		
Engine/Vehicle Address:		
Engine/Vehicle Make:	Model:	Model Year:
Engine Serial Number:	Vehicle Identification Number (when applicable):	
Vehicle Miles Traveled During the Last Year:	Hours of Operation During the Last Year:	
Percent of Vehicles Miles Traveled or Hours of Operation within CA:		
Percent of Vehicles Miles Traveled or Hours of Operation within the Boundaries of the SJVAPCD:		
Amount of Fuel Consumed During the Last Year:	Type of Fuel Used:	
Identify any Maintenance Performed on the Engine/Vehicle:		
Identify any conditions that significantly affected the usage:		
Other Comments:		

Please return this form to: Charlene Cano
San Joaquin Valley Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726-0244

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