

CMAQ COST-EFFECTIVENESS THRESHOLD DOCUMENTATION

Fresno Council of Governments 2017 FTIP

The Congestion Mitigation and Air Quality (CMAQ) program provides funding for transportation projects or programs that contribute to attainment or maintenance of the national ambient air quality standards. All San Joaquin Valley Metropolitan Planning Organizations (MPOs) adopted policies in 2007 for distributing at least 20 percent of the CMAQ funds to projects that meet a cost-effectiveness threshold for emission reductions. For the 2017 Federal Transportation Improvement Program (FTIP), this applies to years 2016-2017 through 2019-2020. *Fresno Council of Governments* has made every effort to expend the minimum 20 percent funding for cost-effective projects over the course of the FTIP and the attached documentation demonstrates that *Fresno Council of Governments* has met the 20 percent funding goal.

Project eligibility continues to be based on federal CMAQ guidance. MPOs can fund projects within local jurisdictions or contribute funding to the San Joaquin Valley Air Pollution Control District (SJVAPCD) grant incentive programs to meet the cost-effectiveness threshold requirements. Funds contributed to the SJVAPCD grant incentive programs will be assumed to have met the threshold, as that threshold is more stringent than the one established by the CMAQ cost-effectiveness policy.

Emission benefits and cost-effectiveness calculations are based on the applicable pollutants for the region, including the components of ozone (nitrogen oxides [NO_x] and reactive organic gases [ROG]) and particulate matter (PM). The “Methods to Find the Cost-Effectiveness of Funding Air Quality Projects” document developed by the Air Resources Board (ARB) is currently the appropriate methodology for calculating cost-effectiveness. In addition, FHWA has published “CMAQ Improvement Program Cost-Effectiveness Tables and Development Methodology” on December 3, 2015 and this methodology will be used to establish project eligibility for project types not addressed in the state guidance. In addition, another appropriate cost-effectiveness calculation methodology may be used upon consultation with interagency partners. Cost-effectiveness is expressed as dollars spent per pound of pollutant reduced (ROG + NO_x + PM_{2.5}+PM₁₀). The cost-effectiveness threshold for the 2017 FTIP has been recommended to be increased to \$45 per pound (\$90,000/ton) from previously recommended level of \$30 per pound (\$60,000 per ton) and is based on CMAQ dollars only, not total project cost.

The Fresno Council of Governments has identified, through existing programmed projects in those years or other selection methods, projects that qualify for the cost-effectiveness policy. The full documentation of the process employed for project selection can be located at: <http://www.fresnocog.org/>

Project Selection Methodology:

Briefly, the Fresno Council of Governments convenes a meeting of the Programming Subcommittee (committee members are from the county, cities, Caltrans and other non-member agencies.) The committee receives the funding information and provides direction for project selection. The *Call-For-Projects -Project Application Packet* is prepared incorporating the direction received from the Programming Subcommittee and is then presented to Fresno COG’s Transportation Technical Committee (TTC), the Policy Advisory Committee (PAC) and the Fresno COG Policy Board. Each of Fresno COG’s committees review the CMAQ application packet and the selection process, as detailed in the CMAQ Application Packet, and then approves the release of the Call-For-Projects announcement. Fresno COG then holds a separate CMAQ Workshop to thoroughly explain the application process including methodology to calculate the emission reductions from the various categories of projects. The project sponsors then submit their applications to Fresno COG, and are reviewed by the Project Scoring Committee using the methodology detailed below. The scored projects are then presented for discussion to the TTC and PAC with final approval by the Fresno COG Policy Board and then are programmed into the FTIP.

For the 2017 FTIP, Fresno COG held two Programming Subcommittee meetings to set the procedures to be used, one meeting was held on October 5, 2015 and another on November 2, 2015. The guidance, at the time, for project eligibility, was FHWA November 12, 2013, *“The Congestion Mitigation and Air Quality (CMAQ) Improvement Program Under the Moving Ahead for Progress in the 21st Century Act: Interim Program Guidance”*. Fresno COG uses ARB Guidance: *“Methods to Find the Cost-Effectiveness of Funding Air Quality Projects May 2005”* to estimate the emission reductions and cost effectiveness of each submitted project.

All projects and programs eligible for CMAQ funds must come from a conforming Regional Transportation Plan and Transportation Improvement Program, and be consistent with the conformity provisions contained in section 176(C) of the Clean Air Act (CAA) and the Transportation Conformity Rule.

Assembly Bill 1012 requires that both State and federal funds be used in a “timely” manner. Each agency must be able to assure that their project(s) can be delivered timely. Therefore, each application must be accompanied by a formal Council/Board/District Resolution stating that each project will meet project delivery schedules and that staff be directed to insure that projects are delivered timely.

In addition, Fresno COG requires a signed statement from each applicant agency committing to deliver the project as described.

Timeline for the 2015-16 CMAQ Call-for-Projects (2017 FTIP)

10/5/16; 11/2/15	Programming Sub-Committee Meetings
12/17/15	COG Policy Board Approves/Initiates Call-for-Projects
12/7/15	CMAQ Workshop
1/22/16	Application Deadline
4/14/16	Scoring Committee Convenes
5/26/16	COG Policy Board Approval
December 2017	Anticipated FHWA approval of 2017 FTIP

Project Category **Target Goals** for the 2015-16 Call-for-Projects
(2017 FTIP)

Total available \$18,464,775

Project Type	Percentage	Available funding
Transit Improvements	20.00%	\$ 3,692,956
Cleaner Fuel Technology	15.00%	\$ 2,769,716
Traffic Flow Improvements	10.00%	\$ 1,846,476
Traffic Signal Projects	4.00%	\$ 738,591
Pedestrian/Bicycle	6.00%	\$ 1,107,887
PM10 Reduction	3.50%	\$ 646,267
Miscellaneous	1.50%	\$ 276,972
Cost-Effective (any project type)	40.00%*	\$ 7,385,910

***Please Note: While the Policy commitment is set at 20%, Fresno COG sets the 'target goal' at 40% to insure compliance with the commitment.**

Scoring Criteria Used:

20 Points	<i>Congestion Relief</i>
	Has impact on congestion and increases service capacity and/or reliability.
10 Points	<i>Trip Reduction</i>
	Reduces vehicle trips and/or vehicle miles traveled.
20 Points	<i>Air Pollutant Emissions Reduction</i>
	Incorporates transportation control measure, reduces emissions of volatile organic compounds, nitrogen oxides, and/or particulate matter.
30 Points	<i>Cost-Effectiveness</i>
	Air pollutant emissions reduction divided by annualized project cost.
20 Points	<i>Subjective Evaluation</i>
	Consider factors of overriding concern, including, but not limited to supports economic development activities, promotes energy conservation, improves quality of life, leverage other funds, promotes system management, etc.
100	<i>TOTAL POINTS AVAILABLE</i>

Fresno COG's Cost-Effectiveness Results
All well above the 20% commitment

February 2008 Call-for-Projects:

- **48%** of the available funding was granted to cost-effective projects.

October 2009 CMAQ Call-for-Projects:

- **39%** of the available funding was granted to cost-effective projects.
 (This "Call" was held earlier than would have been normally scheduled to accommodate the work involved in the 2011 RTP/FTIP cycle and associated transportation conformity determination.)

March 2012 CMAQ Call-for-Projects:

- **52%** of the available funding was granted to cost-effective projects

May 2014 CMAQ Call-for-Projects:

- **40%** of the available funding was granted to cost-effective projects

May 2016 CMAQ Call-for-Projects:

- **37%** of the available funding was granted to cost-effective projects

As stated in the Cost-Effectiveness Policy, the Fresno Council of Governments has agreed to post information related to the implementation of the cost-effectiveness CMAQ policy on its website: <http://www.fresnocog.org/>

Attached is documentation that fulfills this requirement and demonstrates that the Fresno Council of Governments has estimated the amount of funding in the 2017 FTIP necessary to meet the 20 percent cost-effectiveness goal and provides a summary of the CMAQ projects that meet the minimum cost-effectiveness threshold.

CMAQ Cost-Effectiveness Documentation										
2017 FTIP										
Fresno Council of Governments										
Project ID	Lead Agency	Project	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	Estimated Cost Effectiveness dollars/pound	Total	
LSTMP525 FRE170011	Clovis Unified School District	Purchase 1 Clean Diesel Bus	168,207					\$10	\$ 168,207.00	
LSTMP523 FRE170011	Southwest Transportation Agency	Purchase 1 Clean Diesel Bus	168,207					\$18	\$ 168,207.00	
LSTMP526 FRE170011	Clovis Unified School District	Purchase 3 CNG Buses	557,739					\$13	\$ 557,739.00	
LSTMP527 FRE170011	Fresno Unified School District	Purchase 3 CNG Buses	474,290					\$6	\$ 474,290.00	
LSTMP528 FRE170011	Kings Canyon Unified School District	Purchase 2 CNG Buses	348,879					\$28	\$ 348,879.00	
LSTMP529 FRE170011	Sanger Unified School District	Purchase 2 CNG Buses	371,826					\$19	\$ 371,826.00	
LSTMP522 FRE170011	Southwest Transportation Agency	Purchase 2 CNG Buses	371,826					\$28	\$ 371,826.00	
LSTMP532 FRE150044	City of Clovis	Herndon/Temperance Install Class II Bike Lane Improvement		9,738	28,330			\$26	\$ 38,068.00	

**BEFORE THE
COUNCIL OF FRESNO COUNTY GOVERNMENTS
RESOLUTION NO. 2007-17**

In the Matter of:)
)
)
CONGESTION MITIGATION AND)
AIR QUALITY PROGRAM)
_____)

**RESOLUTION ADOPTING THE
LOCAL COST-EFFECTIVENESS
CONGESTION MITIGATION AND
AIR QUALITY (CMAQ) POLICY**

WHEREAS, the Council of Fresno County Governments is a Regional Transportation Planning Agency and a Metropolitan Planning Organization, pursuant to State and Federal designation; and

WHEREAS, federal transportation legislation provides states and Metropolitan Planning Organizations funding from the Congestion Mitigation and Air Quality (CMAQ) program for their region; and

WHEREAS, the San Joaquin Valley Air District has been designated by the Governor of California as the regional air quality planning agency in San Joaquin Valley; and

WHEREAS, the San Joaquin Valley Air District has requested an Extreme classification for the eight-hour ozone nonattainment designation, which would extend the attainment date to 2023; and

WHEREAS, the Metropolitan Planning Organizations in the San Joaquin Valley participated in the development of the eight-hour ozone plan and are committed to improving air quality in the region; and

WHEREAS, the Metropolitan Planning Organizations in the San Joaquin Valley are committed to identify methods of improving funding programs that affect air quality; and

WHEREAS, the resolution and Exhibit A have been reviewed by Council of Fresno County Governments advisory committees representing the technical and management staffs of the member agencies; representatives of other governmental agencies, including State and Federal; representatives of special interest groups; representatives of the private business sector; and residents of Fresno County; and

WHEREAS, the policy listed in Exhibit A only affects federal CMAQ funds and does not imply changes to other funding programs; and.

NOW, THEREFORE, BE IT RESOLVED, that Council of Fresno County Governments commits to implement the local cost-effectiveness CMAQ policy listed in Exhibit A.

THEREFORE, BE IT FURTHER RESOLVED, that Council of Fresno County Governments agrees to proceed with a good faith effort to implement the policy as scheduled and with the funding source identified. Recognizing, however, that the availability of necessary funding depends on the programs or processes of various state and federal agencies, the Council of Fresno County Governments will consider modifications or removal of policies, as necessary. Should future transportation legislation not include CMAQ funding, the cost-effectiveness policy listed in Exhibit A will no longer be in effect.

THE FOREGOING RESOLUTION was passed and adopted by Council of Fresno County Governments this 31st day of May 2007.

AYES: Clovis, Coalinga, Fowler, Fresno, Fresno County, Huron, Kingsburg, Mendota, Orange Cove, Parlier,
San Joaquin, Sanger and Selma

NOES: None

ABSTAIN: None

ABSENT: Firebaugh, Kerman and Reedley

ATTEST:

Signed: 

Trinidad M. Rodriguez, Chairman

I hereby certify that the foregoing is a true copy of a resolution of the Council of Fresno County Governments duly adopted at a regular meeting thereof held on the 31st day of May 2007.

Signed: 
Barbara Goodwin, Executive Director

EXHIBIT A LOCAL COST-EFFECTIVENESS CMAQ POLICY

Summary

The Congestion Mitigation and Air Quality (CMAQ) program provides funding for transportation projects or programs that will contribute to attainment or maintenance of the national ambient air quality standards. The CMAQ program supports two important goals of the Department of Transportation: improving air quality and relieving congestion. SAFETEA-LU strengthens these goals by establishing priority consideration for cost-effective emission reduction and congestion mitigation activities. Exhibit A provides a summary of the policy for distributing at least 20% of the CMAQ funds to projects that meet a minimum cost-effectiveness threshold for emission reductions beginning in FY 2011. This policy will focus on achieving the most cost-effective emission reductions, while maintaining flexibility to meet local needs.

Estimates of Available Funds

Caltrans Programming provides apportionment estimates to all regions of the state. The FTIP is currently developed for a four-year programming cycle; with each new FTIP document, the Council of Fresno County Governments (Fresno COG) will use the Caltrans estimate to develop the available CMAQ funds over the four-year period. Fresno COG commits to dedicate at least 20% of the total funding for the four-year period of each FTIP as part of the local cost-effectiveness CMAQ policy. For example, if an agency is estimated to receive \$20 million over a four year period, it would allocate 20%, or \$4 million, of the CMAQ program to projects that meet a minimum cost-effectiveness.

The CMAQ allocation formula is currently based on population, ozone status, and carbon monoxide status. Revisions to the formula or updates to estimates may result in changes to available funds for the Fresno COG CMAQ program; such updates will also affect the funds available for the local cost-effectiveness policy. CMAQ estimates may be revised at any time due to changes from Caltrans, Federal legislation, or classification of the air quality standards in the San Joaquin Valley.

Timeframe

The local cost-effectiveness CMAQ policy is scheduled to be implemented in FY 2011 because the current federally approved 2007 Federal Transportation Improvement Programs (FTIPs) have committed CMAQ funds through FY 2009 and in some cases, regional commitments through FY 2010. In addition, the current CMAQ programming assists in implementing approved local RACM (Amended 2003 PM-10 Plan) that are committed through 2010.

The San Joaquin Valley Air Basin is currently classified as a serious ozone nonattainment area with an attainment deadline of 2013. As part of the 2007 Ozone plan, the Air District is requesting an "extreme" classification, which would delay the attainment deadline until 2023. If approved and assuming no change to the current funding formula, the MPOs may continue to receive CMAQ funding through that time (2023). The local cost-effectiveness CMAQ policy may remain in effect through 2023; however, continuation of the policy will be reviewed on a regular basis per the Policy Review section below.

Local Allocation of Funds

New CMAQ guidance based on SAFETEA-LU was released by the Federal Highway Administration (FHWA) on October 31, 2006. The new legislation and guidance clarifies project eligibility, including advanced truck stop electrification systems and the purchase of diesel retrofits. SAFETEA-LU directs States and MPOs to give priority to diesel retrofits and to cost-effective congestion mitigation activities that provide air quality benefits. Though SAFETEA-LU establishes these investment priorities, it also retains State and local agencies' authority in project selection, meaning that changes to local procedures are not required by SAFETEA-LU. Fresno COG has previously developed procedures for allocating CMAQ funds; the local cost-effectiveness CMAQ policy will be incorporated into existing procedures. Prioritization and funding of projects will continue to be based on criteria developed by Fresno COG.

Cost-Effectiveness Threshold

Cost-effectiveness is a key component of providing funding to projects that improve air quality and reduce congestion. The cost-effectiveness of an air quality project is based on the amount of pollution it eliminates for each dollar spent. Policies that focus on cost-effectiveness will result in the largest emission reductions for the lowest cost. Cost-effectiveness can be based on total project costs, including capital investments and operating costs. However, for the purposes of this policy, cost-effectiveness is based on CMAQ funding dollars only.

In the state of California, the Air Resources Board (ARB) provides funding for air quality improvement projects through the Carl Moyer Program, which requires that heavy-duty vehicle projects meet a cost-effectiveness threshold. The San Joaquin Valley Air Pollution Control District (SJVAPCD) also uses cost-effectiveness thresholds for projects funded through the REMOVE II and Heavy-Duty Incentive Programs. However, there is currently no minimum cost-effectiveness established for the CMAQ program, and according to recent studies, the numbers vary widely across the country and by project type.

Prior to allocation of CMAQ funds for the local cost-effectiveness policy with each FTIP, the SJV MPOs in consultation with the interagency consultation (IAC) partners will develop the minimum cost-effectiveness threshold. While other criteria may be developed at the discretion of Fresno COG, all projects funded by the 20% of CMAQ dollars related to the local cost-effectiveness CMAQ policy must meet that minimum threshold.

Expenditure of Funds under the Local Cost-Effectiveness Policy

Fresno COG will make every effort to expend the minimum 20% funding for the cost-effective projects as soon as possible beginning in FY 2011. However, recognizing that there are additional issues related to project delivery and financial constraint, Fresno COG will be allowed to meet the 20% funding over the course of the FTIP, beginning with the 2008 FTIP and each new FTIP thereafter. For example, if the four-year estimate is \$5 million, then the MPO could spend \$1 million per year over the four year FTIP cycle, \$5 million in one year, or other combination of funding.

Project eligibility will continue to be based on federal CMAQ guidance. MPOs can continue to fund projects within the local jurisdictions, or contribute funding to the SJVAPCD air quality grant incentive programs to meet their cost-effectiveness threshold requirements.

Emissions Estimates

CMAQ projects must demonstrate an air quality benefit, and the expected emissions reductions will continue to be estimated with the most recent methodology. As of 2007, the ARB “Methods to Find the Cost-Effectiveness of Funding Air Quality Projects” released in 2005 is the appropriate methodology. If necessary, interagency consultation will be used to reach agreement on the methodology for future estimates. Emission benefits and cost-effectiveness calculations will continue to be based on the applicable pollutants for the region, including nitrogen oxides (NOx), volatile organic compounds (VOC), and particulate matter (PM).

Reporting Requirements

Tracking of the CMAQ policy will be achieved through several methods. MPOs must develop annual reports for Caltrans and FHWA that specify how CMAQ funds have been spent and the expected air quality benefits. This report is due by the first day of February following the end of the previous Federal fiscal year (September 30) and covers all CMAQ obligations for that fiscal year. A copy of the CMAQ annual report will also be submitted to the Air District for information purposes. In addition to the required annual report, Fresno COG will post information related to the implementation of the local cost-effectiveness CMAQ policy on its website; this includes a summary of the projects selected for the minimum cost-effectiveness threshold that will be made available at the earliest opportunity.

Policy Review

Due to changes in project costs and technology over time, the MPOs will revisit the minimum cost-effectiveness threshold, as well as policy feasibility, at least once every four years prior to FTIP development. A periodic review of the policy is necessary due to potential changes in federal transportation legislation, apportionments, and project eligibility. This policy will only affect 20% of the allocated federal CMAQ funds, and does not imply changes to other funding programs. Should future transportation legislation not include CMAQ funding, this policy will no longer be in effect.

Example Schedule

The following is an example schedule of the policy implementation and updates. This information is only representative of the general approach and specific schedules will be developed in the future (annual reports will continue to be prepared and submitted as required).

Summer 2007	Develop cost-effectiveness threshold through interagency consultation
Fall 2007	Identify funding available in the 2008 FTIP related to the 20% local cost-effectiveness policy
Spring 2008	Fresno COG call for projects – Quantify, rank, and select CMAQ projects
Summer 2008	Approve 2008 FTIP
Summer 2011	Review policy feasibility. If policy is continued, proceed with following steps.
	Update cost-effectiveness threshold through interagency consultation
Fall 2011	Identify funding available in the 2012 FTIP related to the 20% local cost-effectiveness policy
Spring 2012	Fresno COG call for projects – Quantify, rank, and select CMAQ projects
Summer 2012	Approve 2012 FTIP

DRAFT

CMAQ Cost-Effectiveness Policy Threshold Update – 2017 FTIP for the San Joaquin Valley MPOs

May 5, 2016

Introduction

A review of recent updates to California Air Resources Board (ARB) emission factors developed with EMFAC2014 and Carl Moyer cost-effectiveness limit has been conducted to determine whether an update to the Congestion Mitigation and Air Quality (CMAQ) project cost-effectiveness threshold of \$30/lb adopted by the San Joaquin Valley (SJV) Metropolitan Planning Organizations (MPOs) is warranted.

The cost-effectiveness threshold was first adopted in 2007 as part of the SJV 2007 8-hour Ozone and 2008 PM_{2.5} State Implementation Plans. Valley MPOs have adopted a policy prescribing 20% of CMAQ Program funds to projects that meet the above cost-effectiveness threshold. The adopted policy and threshold were reviewed in August 2009 as part of the 2011 FTIP/RTP development, and no changes to either CMAQ element were recommended at that time. The cost-effectiveness threshold was reviewed again in February 2012 in support of the 2013 FTIP update. Although there was evidence to support a 10% threshold increase, maintaining the project cost-effectiveness threshold at \$30/lb was recommended through the Interagency Consultation (IAC) process, because the revised emission factor information from ARB was not available at the time of the threshold review for the 2013 FTIP update. The latest cost-effectiveness threshold review was conducted in June, 2014 for the 2015 FTIP update and it was recommended to increase the threshold by 30% largely due to the revised ARB emission factors developed with EMFAC2011. However, due to 2015 FTIP scheduling, project selection already began prior to threshold review analysis was complete, thus the threshold remained at \$30/lb for the 2015 FTIP.

The current cost-effectiveness limit must be evaluated for the 2017 FTIP due to a variety of factors, including:

- Emission factors are periodically updated with the release of the new statewide emission models (EMFAC), directly affecting calculated emission reductions.
- Vehicle technology is getting cleaner over time, thus reducing the potential for emission reductions from a given project. A low cost-effectiveness threshold begins to limit how CMAQ funds can be distributed, leading to project selections that may not be in line with the needs of a particular community.

Analysis Methodology

To understand the appropriate magnitude of an acceptable cost-effectiveness threshold increase, the following documents were reviewed:

- California Air Resources Board (ARB) guidelines titled “Methods to Find the Cost-Effectiveness of Funding Air Quality Projects” published in May 2005¹;
- Supporting Emission Factor Tables released in December 2008;
- Supporting Emission Factor Tables released in May 2013²;
- Supporting Emission Factor Tables provided by ARB in May 2016³;
- The December 2015 update to the 2011 Carl Moyer Guidelines; and
- Air district board meeting agendas and minutes related to cost-effectiveness threshold updates.

Emission Factors

The major element of the threshold update methodology is the review and comparison of CMAQ cost-effectiveness emission factors that applied at the time the threshold was set in 2007 and those most recently made available by ARB. In addition, Caltrans has previously confirmed that, in general, California MPOs follow ARB’s cost-effectiveness guidelines to calculate the cost-effectiveness of emission reduction projects that receive CMAQ funding.

Following ARB’s CMAQ methodology, project cost-effectiveness is determined by dividing the annualized project cost in clean air funding dollars by the magnitude of emissions reduction of combined reactive organic gas (ROG), oxides of nitrogen (NO_x), and particulate matter (PM₁₀ and PM_{2.5}) pollutants (Equation 1). Note, that although PM_{2.5} is not yet included in the ARB Cost-Effectiveness Methods Guide of 2005, the May 2013 Emission Factor Tables released by ARB provide PM_{2.5} emission rates that must be considered for project cost-effectiveness together with the other pollutants. Moreover, the FAST Act, signed into law in December 2015, has amended the eligible uses of CMAQ funds set-aside for PM_{2.5} nonattainment and maintenance areas to include diesel retrofits for equipment/vehicles operated on highway construction projects and port-related landside equipment emission reductions.

Equation 1: Cost-effectiveness formula

¹ The guidelines are available at <http://www.arb.ca.gov/planning/tsaq/eval/eval.htm>.

² See Attachment 2, also available at <http://www.arb.ca.gov/planning/tsaq/eval/evaltables.pdf>.

³ Email communication with Dennis Wade, ARB on May 3, 2016. See Attachment 5.

$$\text{Cost-Effectiveness} = \text{Annualized Cost (\$)} / \text{Emission Reduction (tons ROG+NOx+PM}_{10}\text{+PM}_{2.5}\text{)}$$

As shown in Equation 1, the cost-effectiveness of a given CMAQ project is directly related to its incremental cost and inversely related to the magnitude of emission reductions attributed this project. To understand the threshold adjustment needed on the emissions side, the ARB Emission Factor Tables released in December 2008 and the Emission Factor Tables provided by ARB in May, 2016 were compared. The average emission factors for light-duty vehicles (see Table 3 of both versions of the ARB documents) were reduced by approximately 50% for ROG, 60% for NOx and 75% for PM₁₀ and PM_{2.5} for each project life period, as shown in Table 1.

Pollutant	Project Life 1-5 Years			Project Life 11-15 Years		
	2008 Emission Factors (2007-2011) (g/mile)	2016 Emission Factors (2014-2018) (g/mile)	% Reduction	2008 Emission Factors (2007-2021) (g/mile)	2016 Emission Factors (2014-2028) (g/mile)	% Reduction
ROG	0.304	0.148	-51%	0.216	0.101	-53%
NOX	0.357	0.147	-59%	0.241	0.091	-62%
PM _{2.5}	0.204	0.053	-74%	0.205	0.053	-74%
PM ₁₀	0.220	0.057*	-74%	0.221	0.057*	-74%

*-derived by multiplying PM_{2.5} emission factor by 1.08 for gasoline vehicles with catalyst. Source: ARB, PM₁₀ Fractions Referenced to PM_{2.5}, July 2013. Available at <http://www.arb.ca.gov/planning/tsaq/eval/pmtables.pdf>.

As shown in Table 1, the revised emission factors establish a new baseline year of 2014 in the averaging of emission factors over each project life period. However, it should be noted that this baseline is out of date, and the reductions observed will be even higher once the baseline is adjusted to year 2016 due to the current vehicle fleet producing fewer pollutants than previous years. As such, the threshold will likely be increased even further in the future.

Inflation Adjustment

In addition to the revised emission factors, ARB released updated cost-effectiveness limits⁴ in support of the 2011 Carl Moyer Program Guidelines⁵ in December 2015. The update includes a cost-effectiveness limit increase of approximately 4%, from the \$17,460/ton limit adopted as part of 2013 Moyer Guidelines update (last reviewed in June 2014) to \$18,260/ton, to account for inflation. This constitutes a 22% increase from the \$14,300 limit promulgated by ARB used to

⁴ See http://www.arb.ca.gov/msprog/moyer/guidelines/2011gl/2011cmp_appg_20151218.pdf.

⁵ See <http://www.arb.ca.gov/msprog/moyer/guidelines/current.htm>.

establish the adopted \$30/lb threshold for Valley MPOs in 2007. Note, however, that the \$14,300/ton Moyer limit was based on 2004 economic data, while the current \$18,260/ton limit is based on 2015 data. In addition, the capital recovery factors (CRF) were updated based on a revised discount rate of 2%. This change, however, does not affect this analysis, as the SJV MPOs do not annualize project costs to calculate CMAQ project cost-effectiveness. The impacts of revised CRFs are not reflected in the Moyer cost-effectiveness limit update.

Similar to the Moyer cost-effectiveness limit, the CMAQ project cost-effectiveness threshold adopted by the MPOs should be updated to account for inflation. In order to determine the change in inflation rate from 2007 to 2015, Consumer Price Index (CPI) data were obtained from California Department of Financial and Economic Data and inflation rates relative to most recent California CPI data, which are now available for calendar year 2015, were calculated (see Table 2).

Averaging Period	Consumer Price Index	Inflation Rate, %
<i>2004 Annual</i>	<i>195.4</i>	<i>21.6</i>
2007 Annual	217.4	12.7
2012 Annual	238.3	4.3
2013 Annual	241.8	2.9
2014 Annual	246.1	1.2
2015 Annual	249.1	0.0

As illustrated in Table 2, the cost-effectiveness threshold increase attributable to inflation depends on the baseline year selected.

Air District Activity

The last step of the analysis included a review of comparable incentive programs in the San Joaquin Valley and other major Air Districts. District updates or lack thereof were confirmed via telephone communication with appropriate District staff and by reviewing Governing Board meeting agendas and staff reports for each adopted program or its approved revision.

Based on the reviewed documentation, the direction California air districts are pursuing is to either increase the cost-effectiveness threshold so that projects continue to qualify for CMAQ or other incentive program funding under more stringent state and local regulations (e.g., Bay Area's Drayage Truck Retrofit Program) or to remove the threshold for new projects. In addition, cost-effectiveness thresholds are being revised at the air district level to account for

programmatic differences among projects and the most accurate inflation data. For instance, SJVUAPCD staff indicated that REMOVE II program components were reassigned separate cost-effectiveness thresholds that account for recent regional CPI increases, and the vanpool project cost-effectiveness was updated from \$20/lb to \$35/lb. However, no official documentation was found on these cost-effectiveness methodology updates.

Evaluation

In May 2016, ARB provided updated Emission Factor Tables developed with EMFAC2014 for CMAQ cost-effectiveness analyses that are based on calendar year 2014 as the project start year. In comparison to the 2008 Emission Factors Tables developed with EMFAC2007 (based on a 2007 project start year), the average baseline emission rates declined by approximately 50% for ROG, 60% for NO_x, and 75% for PM_{2.5} and PM₁₀. Assuming a direct summation of emission changes for various pollutants in line with the cost-effectiveness formula, a 30% decrease (approximately half of the noted reductions) could be utilized. This conservative assumption is based on the fact that it appears that some projects (e.g., vanpool programs, truck lanes) would see lower emission factor differences according to 2013 ARB Emission Factor Tables for medium and heavy-duty vehicles⁶. In addition, the adopted cost-effectiveness threshold should be adjusted for inflation since 2007 by 20% as described above.

In summary, the MPOs could consider increasing the CMAQ cost-effectiveness threshold by 50% to **\$45/lb (\$90,000/ton)** for the following reasons:

1. To account for the reduction in emission factors since 2007 used in CMAQ project cost-effectiveness calculations.
2. To account for inflation and increase in CPI since 2007, which is when the \$30/lb threshold was last updated.

⁶ Note that MD and HD Emission Factors developed with EMFAC2014 were not provided by ARB at this time.