Tennessee Department of Transportation
Long Range Planning Division

2016 CMAQ Project Competition
Guidelines for Estimating Emission Reductions and Cost-Effectiveness

PROPOSAL DEADLINE: July 1, 2016

These guidelines should be used in estimating the air pollution emission reductions that a proposed CMAQ project may achieve, and in estimating the project cost-effectiveness.

Description of Air Quality Analysis

In the proposal narrative, project sponsors should briefly summarize the results of the air quality analysis, and attach the air quality analysis at the end of their narrative proposals. Air quality analyses should include a description of the emission reduction estimation method, the application of the method to the particular project and the results that were produced (in other words, *show your work*).

For all analyses, please convert the units of estimated emission reductions to kilograms per day.

If your air quality analysis provides unusual results (e.g., a NOx increase), please explain. In the event that the project will cause an increase in one or more pollutants, you must explain why the project is still worthy of funding. Explain whether the project' expected emissions increase is likely to have a negative effect on measured air quality or contribute to an exceedance of an air quality standard.

Air Pollutants of Concern and Weighting Factors

The CMAQ program is focused on those air pollutants that EPA has classified as criteria pollutants under the Clean Air Act and on those pollutants that are precursors to criteria pollutants. Criteria pollutants are widespread air pollutants that are regulated under EPA federal air quality health standards. Under the Clean Air Act, areas may be designated as nonattainment or maintenance for one or more criteria pollutants.

Please report separate emission reduction estimates for each eligible mobile source-related criteria pollutant. These include oxides of nitrogen (NOx), particulate matter 2.5 microns in diameter of less (PM 2.5), volatile organic compounds (VOCs) and carbon monoxide (CO).

Please note that carbon dioxide (CO_2) and other greenhouse gases are not CMAQ-eligible pollutants and estimates of greenhouse gas emission reductions will not be taken into consideration in determining project emission reductions or project cost-effectiveness.

Projects that are estimated to achieve larger reductions of PM 2.5 and NOx will receive higher scores. Those are the pollutants of greatest air quality concern in Tennessee. Emission reductions of the various pollutants will be weighted to represent their relative importance to Tennessee's air quality.

In completing the air quality analysis, report the emission reduction estimates that you prepare. TDOT will add the pollutant weights. PM 2.5 emission estimates will be weighted by a factor of one thousand (1,000). NOx emission will be weighted by a factor of one hundred (100). VOC emissions will be weighted by a factor of ten (10). CO emissions will be weighted by a factor of one (1).

Assumptions on Number of Days of Air Quality Benefits

In completing air quality analyses, project sponsors should carefully choose their analytical assumptions. For example, selecting the number of days that a project will reduce emissions should be based on the characteristics of that project.

For signalization and intersection improvement projects, the air quality benefit is typically estimated by calculating the vehicle delay time that will be reduced by the improved traffic flow achieved by the project. The primary benefits of such projects occur during the normal five-day workweek. For these and similar projects, assume that the emission reduction benefits will occur for 260 days per year (not 365 days per year). This would also apply to other projects whose benefits occur primarily during workday commuting periods.

Duration of Air Quality Benefits

Provide estimated air quality benefits for the first full year of project implementation as well as the lifetime air quality benefits that the proposed CMAQ project will generate. In other words, you should include an estimate of how long the project or program will continue to generate emission reduction benefits. Proposals that overstate the duration of air quality benefits based on unrealistic assumptions will receive lower scores.

Reasonable and Realistic Assumptions

Because emission reduction estimates must often rely on analytical assumptions, reasonable and realistic assumptions will earn higher scores than assumptions that appear overstated. Documenting the accuracy and reasonableness of analytical methods and assumptions (e.g., indicating an official source for the emission estimation method) will strengthen a project proposal.

Cost-Effectiveness of Project Emission Reductions

Proposals that achieve better cost-effectiveness will receive higher scores. More cost-effective proposals will be those that achieve a unit of emission reduction at a lower cost (i.e., a lower cost per kilogram of emission reduction) than competing projects. The estimated cost-effectiveness and expected duration of air quality benefits that are claimed must be addressed explicitly in the required project air quality analysis.

TDOT will assess and score the cost-effectiveness of project proposals. Cost-effectiveness is the project's cost per unit (kg/year) of emission reduction measured several different ways.

The first will be a cost-effectiveness estimate for all criteria pollutants (NOx, VOCs, CO and PM 2.5) calculated based on all the emission reductions for each pollutant added together. Project applicants should use the calculated emission reduction estimates (before weighting) to calculate cost-effectiveness.

One, calculate and describe the proposed project's annual emission reduction (kilograms per year) of each eligible air pollutant that the project will achieve in a year after the project is fully implemented.

Two, calculate and describe the proposed project's **lifetime** emissions reduction benefit over the expected life of the project. In other words, identify the time period that the project will reduce emissions in order to estimate the total air quality benefit of the project.

Three, if a project will reduce emissions of more than one pollutant, add the estimated emission reductions of all eligible pollutants together (except CO2).

The total lifetime emission reductions for all pollutants can then be used to calculate the project's overall cost per kilogram of emission reduction.

The second and third cost-effectiveness calculations will apply to (a) PM 2.5 emissions only and (b) oxides of nitrogen (NOx) emissions only. Project applicants will estimate PM 2.5 and NOx reductions and then complete separate estimates of the cost-effectiveness of the project at reducing PM 2.5 emissions only and then NOx emissions only. Each proposal should contain three cost-effectiveness estimates.

1. CMAQ dollars requested divided by the lifetime emission reductions (kg/year) for all eligible pollutants =
   Overall cost-effectiveness or cost per kilogram for emission reductions of all pollutants
2. CMAQ dollars requested divided by PM 2.5 emission reductions =
   Cost per kilogram of PM 2.5 emission reductions
3. CMAQ dollars requested divided by NOx emission reductions =
   Cost per kilogram of NOx emission reductions