



Chicago Metropolitan
Agency for Planning

CMAQ Performance Plan

September 2018

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CMAQ Program Performance

This report summarizes the federal requirements for the Chicago Metropolitan Agency for Planning (CMAP) in the establishment of performance measure targets associated with the Congestion Mitigation and Air Quality Improvement (CMAQ) program. This includes unified urbanized targets for the performance measures of Peak Hour Excessive Delay (PHED) and Non-SOV travel in the area of traffic congestion, and a quantifiable target for Emissions Reduction for applicable pollutants and precursors for the nonattainment/maintenance areas within the CMAP planning area boundary. The targets described in this report meet the MAP-21/FAST Act performance-based planning and programming requirements and are consistent with the target setting approaches of Illinois and Indiana. The targets were approved for public comment by the MPO Policy Committee on June 14, 2018; there were no comments and the targets are expected to be approved along with the adopted long range transportation plan on October 10, 2018.

Background and Overview

The Moving Ahead for Progress in the 21st Century Act (MAP-21),¹ signed into law on July 6, 2012, transformed the policy and programmatic framework for making investments that guide the growth and development of the Nation's surface transportation program and created a performance-based surface transportation program. The Fixing America's Surface Transportation Act (FAST Act),² signed into law on December 4, 2015, continued and refined these efforts. To examine the effectiveness of the Federal-aid Highway Program as a means to address surface transportation performance at a national level, the United States Department of Transportation (USDOT) established a set of national measures on which state DOTs must report performance.³

For the purpose of carrying out the Congestion Mitigation and Air Quality Improvement (CMAQ) Program, MAP-21 required USDOT to establish measures for state DOTs to use to assess traffic congestion and on-road mobile source emissions.⁴ To meet this requirement, FHWA finalized three CMAQ performance measures (two congestion measures and one on-road mobile source emission reduction measure), listed in Table 1.

¹ Pub. L. 112-141

² Pub. L. 114-94

³ 23 U.S.C. 134, 135, and 150

⁴ 23 U.S.C. 150(c)(5)



Table 1. Performance Measures for the CMAQ Program

Measure	Description
Traffic Congestion	PHED: Annual hours of peak hour excessive delay (PHED) per capita
	Non-SOV: Percent of non-single occupancy vehicle (SOV) travel
On-Road Mobile Source Emissions	Total Emissions Reduction: 2-year and 4- year total emissions reductions for each applicable criteria pollutant and precursor for all projects funded with CMAQ funds (kg/day)
Source: 82 Fed. Reg. 5970 (Jan. 18, 2017) (codified at 23 CFR Part 490), available at https://www.gpo.gov/fdsys/pkg/FR-2017-01-18/pdf/2017-00681.pdf	

The two traffic congestion performance measures are the PHED measure and the percent of non-SOV travel measure. The PHED measure is the annual hours of peak hour excessive delay per capita that occurs within an applicable urbanized area. The percent of non-SOV travel measure is the percentage of non-SOV trips within an applicable urbanized area. The traffic congestion measures apply to the Chicago, IL-IN urbanized area because it includes National Highway System (NHS) mileage and has a population over 1 million people.⁵ The on-road mobile source emissions performance measure is the total emissions reduction measure. The total emissions reduction measure is the estimated emission reductions, for all CMAQ funded projects, of particulate matter (PM10) and volatile organic compounds (VOC) and oxides of nitrogen (NOx) because these are the applicable criteria pollutants and precursors for which the Chicago area is designated nonattainment or maintenance.⁶

The target reporting deadline for all measures for the 1st performance period is October 1, 2018.⁷ In establishing targets, Chicago Metropolitan Agency for Planning (CMAP) staff coordinated with the Illinois Department of Transportation (IDOT), Indiana Department of Transportation (INDOT) and the Northwestern Indiana Regional Planning Commission (NIRPC) to ensure consistency to the maximum extent practicable. In addition to the reporting required by the regulation, 23 United States Code (U.S.C.) 149(l) requires each MPO serving a transportation management area (TMA) with a population over 1,000,000 that includes a nonattainment or maintenance area to develop a CMAQ Performance Plan to support the implementation of the CMAQ measures.⁸ In the CMAQ Performance Plan and its biennial updates, CMAP will report 2 and 4 year targets, describe how we plan to meet our targets, and detail our progress toward achieving the targets over the course of the performance period. The performance periods and reporting timeline for CMAQ measures are indicated in Figure 1 below.

⁵ 23 CFR 490.703

⁶ 23 CFR 490.807

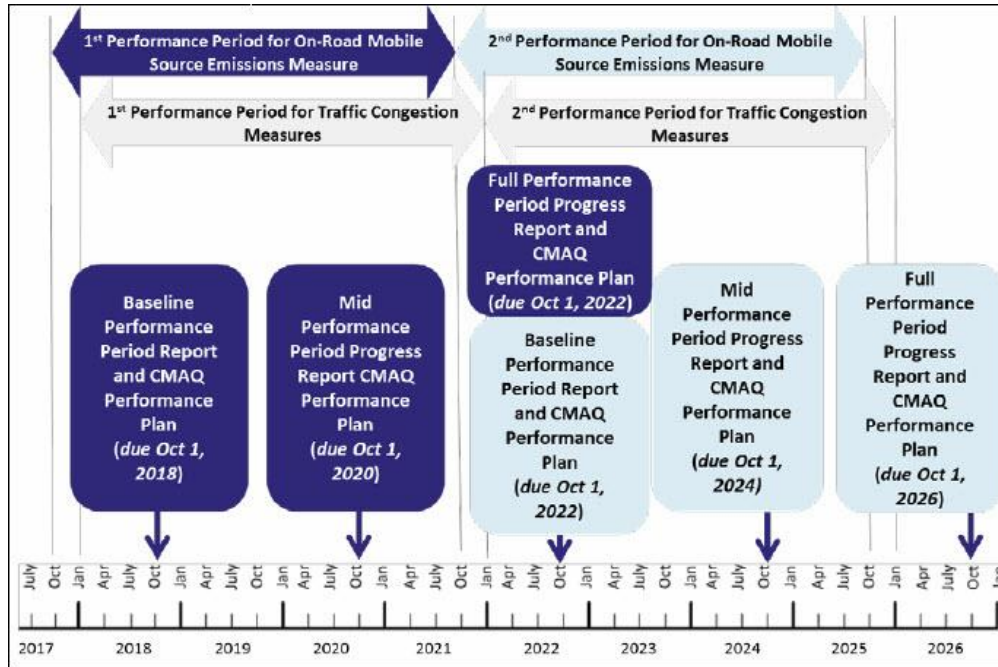
⁷ 23 CFR 490.107(b)(1)(i)

⁸ 23 CFR 490.107(c)(3)



This document summarizes requirements, data sources and methodology for each CMAQ performance measure and outlines the baseline performance, targets, and description of projects receiving CMAQ funding that will contribute toward achieving the targets.

Figure 2. Performance Periods for CMAQ Measures and Reporting Timeline



Source: FHWA CMAQ Performance Plan Guidebook for MPOs

Data Requirements and Sources

CMAQ is required to use certain data sources to calculate condition and performance for the traffic congestion and on-road mobile source emissions measures, described in the tables that follow.

Peak Hour Excessive Delay (PHED)

The Illinois Department of Transportation (IDOT), Indiana Department of Transportation (INDOT), CMAP and NIRPC are required to use the same travel time data set for calculating the PHED measure and must establish and report single, unified targets for the Chicago urbanized area.⁹ The data sets used to calculate the PHED were processed by CMAP staff and the Regional Integrated Transportation Information System (RITIS)¹⁰ MAP-21 PHED tool.

⁹ 23 CFR 490.103(e) and 23 CFR 490.105(f)(5)(iii)(B)

¹⁰ Regional Integrated Transportation Information System www.ritis.org

Table 2. Data Sources for PHED Measure

Data	Data Source
Urbanized Area Boundary	U.S. Decennial Census; FHWA's Highway Performance Monitoring System Filed Manual
Urbanized Area Population	5-year annual estimates of the total population of the urbanized area from the American Community Survey (Table DP05)
Reporting Segments	National Performance Management Research Data Set (NPMRDS)
Travel Times in 15-minute Intervals	National Performance Management Research Data Set (NPMRDS)
Hourly Traffic Volume	National Performance Management Research Data Set (NPMRDS) via Highway Performance Monitoring System (HPMS). Hourly volume estimates follows the method described in "MAP-21 Proposed Measures for Congestion, Reliability, and Freight: Step-by-Step Calculations Procedures" (https://www.apta.com/gap/fedreg/Documents/MAP-21_Proposed_Measures_for_Congestion,_Reliability,_and_Freight.pdf)
Annual Vehicle Classification for Buses, Trucks, and Cars	National Performance Management Research Data Set (NPMRDS) via HPMS.
Annual Vehicle Occupancy for Buses, Trucks, and Cars	Values recommended by FHWA. https://www.fhwa.dot.gov/tpm/guidance/avo_factors.pdf
Speed Limits	Illinois Highway Information System (IHIS)

Non-SOV Travel

For the Chicago urbanized area, IDOT, INDOT, CMAP and NIRPC agreed upon a data source and method to calculate the Non-SOV travel measure.

Table 3. Data Sources for Non-SOV Travel Measure

Data	Data Source
Mode of Commuting to Work	5-year estimate for "Commuting to Work" totaled by mode from the U.S. Census Bureau's American Community Survey dataset, table DP03, for Chicago urbanized area.



Total Emissions Reduction

FHWA's CMAQ Public Access System is the required data source for calculating the Total Emissions Reduction measure.¹¹ IDOT is responsible for submitting project information to the CMAQ Project Tracking System by March 1 of each federal fiscal year (FFY), along with the CMAQ Annual Report, for all projects obligated in the previous FFY.

Table 4. Data Sources for Total Emissions Reduction Measure

Data	Data Source
Emissions reduction estimated for each CMAQ funded project by pollutant and precursor (kg/day)	IDOT extracted data from the CMAQ Public Access System found at https://fhwaapps.dot.gov/cmqa_pub/

Performance Plan

Baseline Performance

As this document is the CMAQ Performance Plan for the beginning of the performance period, CMAP must report baseline performance for each CMAQ measure. For the biennial updates to the plan, submitted at the midpoint and end of the performance period, CMAP will report performance during the two- and four-year periods. For the PHED and Non-SOV measures, baseline performance is reported for calendar year 2017. For the Total Emissions Reduction measure, baseline performance is reported for the applicable pollutants associated with CMAQ funded projects obligated in federal fiscal years 2014 through 2017.

Peak Hour Excessive Delay (PHED)

This measure is calculated using data from the FHWA's National Performance Management Research Data Set (NPMRDS). The NPMRDS provides travel time by road segment for the NHS in 15-minute intervals. Travel times are provided for passenger, freight, and combined values. Along with the travel time information, a geographic file of the road segments is provided through the NPMRDS.

The geographic file includes information for each road segment including length in miles, average annual daily traffic, functional classification, and other roadway attributes. A conflation process was used to assign a speed limit information to the NPMRDS data. The 4:00 p.m. – 8:00 p.m. afternoon peak is used to be consistent with CMAP's travel model time periods.

The PHED is calculated for each 15-minute interval in the peak periods for all segments in the Chicago urban area. The 15 minute interval PHED is calculated in the following steps:

¹¹ 23 CFR 490.809(a)



- Segment length divided by a segments speed threshold (larger of 20 mph, or 60 percent of speed limit) times 3,600 where travel time less than or equal to 900 seconds.
- Segment travel time minus the result from above step
- If result from above step greater than 0, then result divided by 3600
- Result from above step multiplied by the 15-minute volume and the average vehicle occupancy for the segment
- The results from the above steps are summed for the urban area and divided by the urbanized area population

The total PHED is divided by the urbanized area population to calculate the peak hour excessive delay per capita. IDOT provided access to the RITIS¹² tool that was used to calculate this measure.

Table 5. Baseline Performance Period PHED

CY 2017 Performance
14.8 hours

Non-SOV Travel

The baseline for the Non-SOV Travel is calculated using the most recent table DP03 from five-year estimated of the U.S. Census Bureau’s American Community Survey (ACS) dataset. 2016 is the most recent five-year data available. The percentage of commuters that predominantly do not commute by driving along in a car, van or truck is used.

Table 6. Baseline Performance Period Non-SOV Travel

CY 2016 Performance
30.6%

Total Emissions Reduction

Applicable criteria pollutants for the CMAP non-attainment area include ozone particulate matter 10 microns (PM₁₀) as reported in Environmental Protection Agency’s Green Book.¹³ Primary precursors for ozone are volatile organic compounds (VOC) and nitrogen oxides (NO_x). In the recent past, the region was also in non-attainment for Particulate Matter 2.5 microns (PM_{2.5}) and only entered attainment status do to faulty monitoring data. It is likely that the region will again enter non-attainment status once reliable data is available in the next

¹² Regional Integrated Transportation Information System www.ritis.org

¹³ <https://www.epa.gov/green-book>



couple of years. Because of this, baseline performance and targets are reported for PM_{2.5} but are not required at this time.

The Total Emissions Reduction measure for each of the criteria pollutants or applicable precursors for all projects reported to FHWA’s CMAQ Public Access System are calculated to the nearest one thousandth by using the daily kilograms of emission reductions. CMAP staff calculates the daily kilograms of emission reductions as part of the project evaluation and selection process and provides that information to IDOT staff for entering into the CMAQ Public Access System. Lyons Township in western Cook County is declared a maintenance area for PM₁₀. The maintenance area is not the result of mobile source emissions but a point source problem related to quarry activities within the township. Because these emissions are unrelated to transportation and mobile sources the baseline performance and targets are reported as zero.

Table 7. Baseline Performance Period Total Emissions Reduction

Criteria Pollutants and Applicable Precursors	FFYs 2014-2017 Performance (kg/day)
Volatile Organic Compounds (VOC)	279.242
Nitrogen Oxides (NOx)	1,271.470
Particulate Matter (PM _{2.5})	47.555
Particulate Matter (PM ₁₀)	0.000

Targets

CMAP must establish both 2-year and 4-year targets for the Chicago metropolitan planning area for each CMAQ performance measure.

Peak Hour Excessive Delay (PHED)

The 2017 baseline PHED of 14.8 hours was used to set the 2022 target. This target was set in coordination with CMAP and NIRPC staff using data developed by NIRPC staff for the Indiana portion and RITIS for the Illinois portion of the urban area. Trend data and other factors were considered in setting the target including construction and agency policies and goals of increasing transit ridership, transit supportive land uses, and improving traffic operations.



Table 8. PHED Performance Targets

2-year Target	4-year Target
N/A	15.4

Non-SOV Travel

The targets were set in coordination between CMAP and NIRPC staff based upon ACS trends between 2012 and 2016 and the ON TO 2050 goal of doubling transit ridership in the CMAP region by 2050 and the anticipated effects this would have on the non-SOV travel in the urbanized area.

Table 9. Non-SOV Travel Performance Targets

2-year Target	4-year Target
31.4%	31.9%

Total Emissions Reduction

The combined the total daily emission reductions for CMAP's FFY 2018-2022 CMAQ program was used to develop an annual estimate to generate the 2-year and 4-year targets.

Table 10. Total Emissions Reduction Performance Targets

Criteria Pollutants and Applicable Precursors	FFY 2018-2022 Program (kg/day)	2-year Target (kg/day)	4-year Target (kg/day)
Volatile Organic Compounds (VOC)	307.587	123.035	246.070
Nitrogen Oxides (NOx)	8,304.398	3,321.759	6,643,518
Particulate Matter (PM _{2.5})	540.220	216.088	432.176
Particulate Matter (PM ₁₀)	0.000	0.000	0.000



Description of Projects

Included in the table below are the project type categories identified for funding in CMAP's FFY 2018-2022 CMAQ program¹⁴ and a description of how they will contribute to achieving the 2-year and 4-year targets for the traffic congestion and on-road mobile source emissions reduction measures.

Table 11. Description of Projects in FFY 2018-2022 CMAQ Program

Project Category	Programmed FFY	Total Emissions Reduction (kg/day)				PHED Benefit	Non- SOV Travel Benefit
		VOC	NO _x	PM _{2.5}	PM ₁₀		
Access to Transit	2018	4.835	0.721	0.000	0.000	No	Yes
	2019	1.295	0.490	0.000	0.000		
	2020	0.000	0.000	0.000	0.000		
	2021	0.303	0.089	0.000	0.000		
	2022	0.326	0.092	0.000	0.000		
Bicycle & Pedestrian	2018	2.077	1.507	0.000	0.000	No	Yes
	2019	5.688	4.029	0.000	0.000		
	2020	0.047	0.035	0.000	0.000		
	2021	0.001	0.000	0.000	0.000		
	2022	0.000	0.000	0.000	0.000		
Bottleneck Elimination	2018	5.809	2.492	0.000	0.000	Yes	No
	2019	0.687	0.831	0.000	0.000		
	2020	1.679	0.000	0.000	0.000		
	2021	0.000	0.000	0.000	0.000		
	2022	1.274	0.292	0.000	0.000		
Direct Emissions Reduction	2018	41.046	456.799	26.425	0.000	N/A	N/A
	2019	13.219	296.448	3.570	0.000		
	2020	0.000	0.000	0.000	0.000		
	2021	67.805	7368.582	510.225	0.000		
	2022	0.000	0.000	0.000	0.000		
Intersection Improvement	2018	4.912	5.758	0.000	0.000	Yes	No
	2019	1.901	1.663	0.000	0.000		
	2020	0.274	0.207	0.000	0.000		
	2021	0.592	0.219	0.000	0.000		
	2022	0.341	0.085	0.000	0.000		
Signal Interconnect	2018	1.701	1.899	0.000	0.000	Yes	No
	2019	51.689	44.827	0.000	0.000		
	2020	0.000	0.000	0.000	0.000		

¹⁴ Program current as of June 14, 2018 – the date targets were released for public comment by MPO Policy Committee



	2021	2.951	3.832	0.000	0.000		
	2022	0.000	0.000	0.000	0.000		
Transit Facility Improvement	2018	0.046	0.034	0.000	0.000	No	Yes
	2019	0.000	0.000	0.000	0.000		
	2020	4.968	1.304	0.000	0.000		
	2021	1.534	0.422	0.000	0.000		
	2022	1.788	0.302	0.000	0.000		
Transit Service	2018	28.546	44.660	0.000	0.000	No	Yes
	2019	0.678	0.431	0.000	0.000		
	2020	0.000	0.000	0.000	0.000		
	2021	0.000	0.000	0.000	0.000		
	2022	0.000	0.000	0.000	0.000		
Other	2018	13.274	12.860	0.000	0.000	No	Yes
	2019	45.270	52.570	0.000	0.000		
	2020	0.000	0.000	0.000	0.000		
	2021	0.000	0.000	0.000	0.000		
	2022	0.724	0.000	0.000	0.000		
FFY Totals	2018	102.554	527.649	26.425	0.000	N/A	
	2019	120.427	401.288	3.570	0.000		
	2020	6.968	1.546	0.000	0.000		
	2021	73.186	7373.144	510.225	0.000		
	2022	4.453	0.771	0.000	0.000		
Total	2018-2022	307.587	8304.398	540.220	0.000		

