Agenda Item No.9.0

Chicago Metropolitan Agency for Planning

CMAQ Mid-Point Performance Plan

October 2020

CMAQ Mid-Point Performance Plan

CMAQ Program Performance

This report summarizes the federal requirements for the Chicago Metropolitan Agency for Planning (CMAP) in the establishment and monitoring of performance measure targets associated with the Congestion Mitigation and Air Quality Improvement (CMAQ) program. On October 10, 2018 the 2-year and 4-year targets contained in this report were approved by the MPO Policy Committee along with the adoption of ON TO 2050[1]. The performance measure targets include unified urbanized targets for the performance measures of Peak Hour Excessive Delay (PHED) and Non-Single Occupancy Vehicle (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 describe in this report meet the Moving Ahead for Progress in the 21st Century Act (MAP-21)/ Fixing America's Surface Transportation Act (FAST Act) performance-based planning and programming requirements and are consistent with the target setting approaches of Illinois and Indiana. This report contains a 2-year progress assessment in achieving those performance targets.

See Appendix A for a background and overview of the federal performance measure targets for CMAQ and Appendix B for data requirements and sources.

Performance Plan

Baseline Performance

The CMAQ Performance Plan is required to report baseline performance for each CMAQ measure. For the PHED and Non-SOV measures, baseline performance is reported for calendar years 2017 and 2016 respectively. 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 Federal Highway Administration's (FHWA) National Performance Management Research Data Set (NPMRDS). The NPMRDS provides travel time by road segment for the National Highway System (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.

[1] **https://www.cmap.illinois.gov/2050**

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:

- Segment length divided by a segment's speed threshold (larger of 20 miles per hour, 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. Illinois Department of Transportation (IDOT) provided access to the Regional Integrated Transportation Information System (RITIS)[2] tool that was used to calculate this measure.

Table 1. 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 alone in a car, van or truck is used.

Table 2. Baseline Performance Period Non-SOV Travel

CY 2017 Performance
30.6% (2016)

[2] Regional Integrated Transportation Information System www.ritis.org

Total Emissions Reduction

Applicable criteria pollutants for the CMAP non-attainment area include ozone and particulate matter 10 microns (PM_{10}) as reported in Environmental Protection Agency's Green Book.[3] Primary precursors for ozone are volatile organic compounds (VOC) and nitrogen oxides (NOx). 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 due to faulty monitoring data. It is likely that the region will again enter non-attainment status once reliable data is available in the next 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 inclusion in the CMAQ Public Access System. Lyons Township in western Cook County is declared a maintenance area for PM_{10}. 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 3. 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 and Assessment of Progress

CMAP must establish both 2-year and 4-year targets for the Chicago metropolitan planning area for each CMAQ performance measure and assess the progress of those targets with each biannual update of this report.

[3] https://www.epa.gov/green-book

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 Northwestern Indiana Regional Planning Commission (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 4. PHED Performance Targets

Baseline	2-year Target	2-year Progress Assessment	4-year Target
14.8	N/A	14.5	15.4

While the PHED is a 4-year target, a 2-year progress assessment was done using RITIS numbers from 2018 and 2019. RITIS showed a PHED of 14.5 hours for 2019. This is below the baseline of 14.8 hours set in 2017 but the 2019 numbers may be an anomaly as RITIS had the PHED for 2018 at 17 hours. No adjustment to the 4-year target is recommended at this time.

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 5. Non-SOV Travel Performance Targets

Baseline	2-year Target	2-year Progress Assessment	4-year Target
30.6% (2016)	31.4%	31.2% (2018)	31.9%

The 2-year progress assessment shows a non-SOV travel percentage of 31.2% which is just below the 2-year target of 31.4%. Because of the delay in ACS data the assessment data is for 2018 and the 2-year target is set for 2019. The non-SOV travel percentage is moving in the right direction for the 4-year target and an adjustment of that target is not proposed.

Total Emissions Reduction

The combined the total daily emissions 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 6. Total Emissions Reduction Performance Targets

Criteria Pollutants and Applicable Precursors	Baseline	2-year Target (kg/day)	2-year Progress Assessment (kg/day)	4-year Target (kg/day)
Volatile Organic Compounds (VOC)	279.242	123.035	106.143	246.070
Nitrogen Oxides (NOx)	1,271.470	3,321.759	7,247.636	6,643,518
Particulate Matter ($PM_{2.5}$)	47.555	216.088	505.023	432.176
Particulate Matter (PM_{10})	0.000	0.000	0.000	0.000

The progress assessment for the emissions reduction shows that both the 2-year targets for NOx and $PM_{2.5}$ have been meet as well as the 4-year year targets for those criteria pollutants. The VOC assessment shows a 16.892 kilograms per day short fall which is 14% of the 2-year target. Looking at the description of projects in Table 7 below shows that 5 out of the 9 project types underperformed based upon the program of projects in 2018. Those projects that did not move to construction or implementation are still in the program and the region is still able to meet the VOC 4-year target. No adjustment to the 4-year target is recommended at this time.

Description of Projects

Included in the table below are the project type categories identified for funding in CMAP's FFY 2018-2022 CMAQ program[4] 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.

[4] Programmed projects as of June 14, 2018

Table 7. Description of Projects in FFY 2018-2022 CMAQ Program and 2-year Progress Assessment

Project Category	Programmed FFY	Programmed Total Emissions Reduction (kg/day)			2-year Progress Assessment of Total Emissions Reduction (kg/day)			PHED Benefit	Non-SOV Travel Benefit
		VOC	NOx	$PM_{2.5}$	VOC	NOx	$PM_{2.5}$		
Access to Transit	*2018*	4.835	0.721	0.000	4.778	0.994	0.000	No	Yes
	2019	1.295	0.490	0.000	0.875	0.600	0.000		
	2020	0.000	0.000	0.000					
	2021	0.303	0.089	0.000					
	2022	0.326	0.092	0.000					
Bicycle & Pedestrian	*2018*	2.077	1.507	0.000	0.401	0.281	0.000	No	Yes
	2019	5.688	4.029	0.000	1.972	1.340	0.000		
	2020	0.047	0.035	0.000					
	2021	0.001	0.000	0.000					
	2022	0.000	0.000	0.000					
Bottleneck Elimination	*2018*	5.809	2.492	0.000	4.330	1.0115	0.000	Yes	No
	2019	0.687	0.831	0.000	0.698	0.698	0.000		
	2020	1.679	0.000	0.000					
	2021	0.000	0.000	0.000					
	2022	1.274	0.292	0.000					
Direct Emissions Reduction	*2018*	41.046	456.799	26.425	0.000	0.000	0.000	N/A	N/A
	2019	13.219	296.448	3.570	56.802	7222.29	505.023		
	2020	0.000	0.000	0.000					
	2021	67.805	7368.582	510.225					
	2022	0.000	0.000	0.000					
Intersection Improvement	*2018*	4.912	5.758	0.000	1.895	2.570	0.000	Yes	No
	2019	1.901	1.663	0.000	0.496	0.333	0.000		
	2020	0.274	0.207	0.000					
	2021	0.592	0.219	0.000					
	2022	0.341	0.085	0.000					
Signal Interconnect	*2018*	1.701	1.899	0.000	0.494	0.144	0.000	Yes	No
	2019	51.689	44.827	0.000	7.827	9.258	0.000		
	2020	0.000	0.000	0.000					
	2021	2.951	3.832	0.000					
	2022	0.000	0.000	0.000					
Transit Facility Improvement	*2018*	0.046	0.034	0.000	5.584	1.698	0.000	No	Yes
	2019	0.000	0.000	0.000	0.000	0.000	0.000		
	2020	4.968	1.304	0.000					
	2021	1.534	0.422	0.000					
	2022	1.788	0.302	0.000					
	2018	28.546	44.660	0.000	5.821	2.370	0.000	No	Yes

Project Category	Programmed FFY	Programmed Total Emissions Reduction (kg/day)			2-year Progress Assessment of Total Emissions Reduction (kg/day)			PHED Benefit	Non-SOV Travel Benefit
		VOC	NOx	$PM_{2.5}$	VOC	NOx	$PM_{2.5}$		
Transit Service	*2019*	0.678	0.431	0.000	14.170	13.100	0.000		
	2020	0.000	0.000	0.000					
	2021	0.000	0.000	0.000					
	2022	0.000	0.000	0.000					
Other	*2018*	13.274	12.860	0.000	0.000	0.000	0.000	No	Yes
	2019	45.270	52.570	0.000	0.000	0.000	0.000		
	2020	0.000	0.000	0.000					
	2021	0.000	0.000	0.000					
	2022	0.724	0.000	0.000					
FFY Totals	*2018*	102.554	527.649	26.425	23.303	9.022	0.000	N/A	
	2019	120.427	401.288	3.570	82.840	7247.61	505.023		
	2020	6.968	1.546	0.000					
	2021	73.186	7373.144	510.225					
	2022	4.453	0.771	0.000					
Total	***2018-2022***	**307.587**	**8304.398**	**540.220**	**123.04**	**7,247.6**	**216.088**		

Appendix A: Background and Overview

The Moving Ahead for Progress in the 21st Century Act (MAP-21),[5] 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),[6] 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.[7]

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.[8] 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 8.

Table 8. 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 NHS mileage and has a population over 1 million people.[9] The on-road mobile source emissions performance measure is the total emissions reduction measure. The total emissions reduction

[5] Pub. L. 112-141

[6] Pub. L. 114-94

[7] 23 U.S.C. 134, 135, and 150

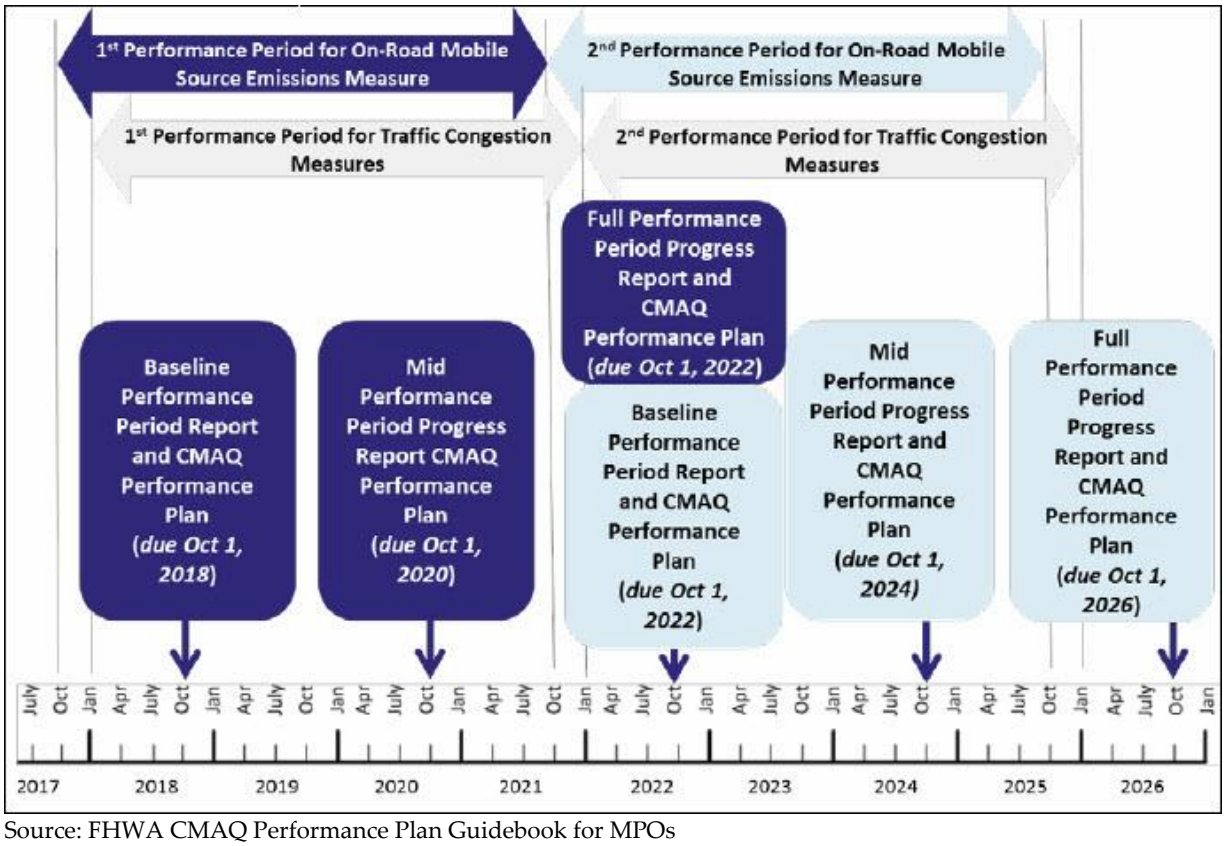
[8] 23 U.S.C. 150(c)(5)

[9] 23 CFR 490.703

measure is the estimated emission reductions, for all CMAQ funded projects, of particulate matter (PM_{10}) 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.[10]

The target reporting deadline for all measures for the 1st performance period is October 1, 2018.[11] In establishing targets, CMAP staff coordinated with the IDOT, INDOT and 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.[12] 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.

Figure 1. Performance Periods for CMAQ Measures and Reporting Timeline



Source: FHWA CMAQ Performance Plan Guidebook for MPOs

[10] 23 CFR 490.807

[11] 23 CFR 490.107(b)(1)(i)

[12] 23 CFR 490.107(c)(3)

Appendix B: Data Requirements and Sources

Certain data sources are required by USDOT to calculate condition and performance for the traffic congestion and on-road mobile source emissions measures, as follows.

Peak Hour Excessive Delay (PHED)

IDOT, 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.[13] The data sets used to calculate the PHED were processed by CMAP staff and the RITIS[14] MAP-21 PHED tool.

Table 9. Data Sources for PHED Measure

Data	Data Source
Urbanized Area Boundary	U.S. Decennial Census; FHWA's Highway Performance Monitoring System (HPMS) 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	NPMRDS
Hourly Traffic Volume	NPMRDS via 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	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)

[13] 23 CFR 490.103(e) and 23 CFR 490.105(f)(5)(iii)(B)

[14] Regional Integrated Transportation Information System www.ritis.org

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 10. 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.[15] 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 11. 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/cmq_pub/

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[15] 23 CFR 490.809(a)