

CMAQ Performance Plan

Mid Performance Period Progress Report



Houston-Galveston Area Council

Approved by the Transportation Policy Council

September 25, 2020

Introduction

The purpose of this report is to provide a mid-term update to H-GAC’s 2018 CMAQ Performance Plan Report. This will serve to document the progress towards meeting the region’s two-year targets for peak-hour excessive delay, non-single-occupant-vehicles, and on-road mobile source emissions as set in that report. Additionally, this report will recommend revisions to the region’s four-year targets as necessary. These targets and target revisions were established by the Houston-Galveston Area Council with regional stakeholder input in coordination and consultation with the Texas Department of Transportation (TxDOT) as well as other regional metropolitan planning organizations (MPOs) within the State of Texas.

Initial Baseline Condition

To establish targets, H-GAC and TxDOT looked at baseline conditions in the Houston-Galveston region for three specific measures that relate to the CMAQ program:

- Peak-Hour Excessive Delay Measure (PHED)
- Non-Single-Occupant-Vehicle Measure (Non-SOV)
- On-Road Mobile Source Emissions Measure

The results of these analyses for the baseline years are documented below.

Traffic Congestion Measures

Two of the congestion measures relate to traffic conditions: Peak Hour Excessive Delay (PHED) and Non-Single Vehicle Occupancy Travel (Non-SOV). The PHED measure is defined as the annual hours of peak hour excessive delay per capita. Excessive delay refers to the additional time spent in congestion based on an established speed threshold. Peak periods are defined as Monday through Friday 6:00AM – 10:00AM and 3:00PM – 7:00PM. The baseline annual PHED per capita measure for the Houston-Galveston region is 14.0 hours. After years of construction, the opening of US 290 and other major corridors in the 8-county region contributed to better reliability. Peak Hour Excessive Delay is holding steady at 14 hours for 2018 and 2020. H-GAC staff is not recommending an adjustment to the original 2022 target of 14.0 hours. Additional information about PHED target progress can be found in Table 1.

Table 1 – PHED Baseline, Targets and Target Achievement

Measure	Baseline	2020 Targets	2020 Actuals	2020 Target achieved?	2022 Targets	2022 Target Adjustments
Peak Hour Excessive Delay	14	14	14	YES	14	14

(A decreased value indicates improvement.)

While H-GAC achieved the 2020 performance target for Peak Hour Excessive Delay (PHED), it is important to identify issues with the underlying data used to calculate the performance and achievement. Methods for calculating this measure are prescribed in federal guidance. The paragraphs that follow detail some of the data issues with measuring Peak Hour Excessive Delay.

The Texas Department of Transportation contracts with the Texas A&M Transportation Institute (TTI) to calculate the conditions of Peak Hour Excessive Delay (PHED). TTI used the National Performance Management Research Data Set (NPMRDS) roadway segments defined as Traffic Message Channel (TMC)

segments for their estimation of the PHED. These TMC roadway lengths are updated periodically by the NPMRDS vendor INRIX; these changes can have significant impacts on the PHED. The TMC length changes were the results of INRIX changing its base map when switching from TomTom to HERE Technologies.

The TMC roadway segments for the years of 2017-2018 and 2018-2019 were compared to determine if there were any changes. This comparison showed that between 2017 and 2018, approximately 1% of the TMC segments changed by +/- 10%, however, during that time, the Annual Average Daily Traffic (AADT) assigned to TMCs changed by over 20%. The important point is that between 2018 and 2019, over 80% of the TMC segment lengths changed by +/- at least 10%, and a minimum of 20% of the AADT assigned to TMCs changed by at least +/- 10%.

Generally, one of the two inputs to personal-miles of travel (the variable combined with speed data to calculate delay) changed between 2017 and 2018. However, both variables (length and AADT) changed significantly between 2018 and 2019, consequently amplifying the effects. When the lengths of the TMC roadway segments or AADT change, this alters the personal miles of travel assigned to the TMC. As a result, these changes can modify the speeds that are captured inside the shorter or longer TMC segments causing the TMCs to have completely different characteristics across the years. Currently, the data is not consistent enough to be able to monitor Peak Hour Excessive Delay (PHED) of the transportation system. The analysis of data changes shows that PHED estimates are highly variable and meeting PHED targets may be problematic in the future. H-GAC will continue working with Texas Transportation Institute staff to review future changes to the input data and monitor the performance of excessive delay.

Non-Single Vehicle Occupancy Travel (Non-SOV) performance measure, the Non-SOV measure is computed as the percent of working population that do not drive alone to work in a car, van or truck or those who ride public transit, rideshare, bicycle or telecommute to work. The conditions and targets for the percent of the Non-Single Occupant Vehicles are based on the Houston-Galveston Area Council travel demand model mode choice model output. Mode choice predicts the choices that individuals or groups make in selecting their transportation modes: single occupant vehicles, carpool, transit, and non-motorized. An important objective of the model is to predict the share of trips attracted to public transportation. Other factors considered for mode choice include socio-economic or household characteristics, travel time, travel cost and access to mass transit options. H-GAC staff will continue to monitor the performance of mode choice. Additional information about Non-SOV target progress can be found in Table 2.

Table 2 – Non-SOV Baseline, Targets and Target Achievement

Measure	2018 Baseline	2020 Targets	2020 Actuals	2020 Target achieved?	2022 Targets	2022 Target Adjustments
Non-Single Occupant Vehicle Trips	20.1%	21.1%	21.1%	YES	22.1%	20.0%
<i>(An increased value indicates improvement.)</i>						

The COVID19 pandemic of 2020 has drastically impacted reliability and congestion performance. Indeed, the full impacts of the pandemic on traffic have yet to be realized. As a result, it is unclear what the outcomes will be in future years and may cause achieving future targets problematic. In conclusion, H-GAC staff will continue to work with the Texas Transportation Institute, the Texas Department of Transportation, and other partners to monitor and understand the performance of the background data

used to calculate reliability and congestion measures. This is expected to result in the best possible target projections and achievements.

H-GAC staff is recommending the adjustment of the Non-Single Occupant Vehicle 2022 target to 20% due to the expected impacts from the Coronavirus pandemic as shown in Table 2 above.

CMAQ On-Road Mobile Source Emissions Measures Targets

During the initial performance period, in 2018, H-GAC developed an initial estimate of on-road mobile source emissions reductions related to CMAQ-funded projects within the agency’s service area. H-GAC and TxDOT used the Transportation Improvement Program (TIP) to develop initial performance target estimates. For this initial target, emission reduction estimates attributed to TIP projects in federal fiscal years 2019-2022 were summed in kg/day to determine initial target estimates. This time span, agreed upon through discussions with TxDOT as well as other MPOs within Texas, used NO_x and VOC emissions estimates from programmed TIP projects anticipated to begin between 2019 and 2022. For this first performance period, the two-year target was determined by summing TIP projects from 2019 and 2020, while the four-year target was determined by summing TIP projects from 2019, 2020, 2021, and 2022. These targets were presented to and approved by the regional Transportation Policy Council and submitted to TxDOT prior to the October 1, 2018 deadline for inclusion in the State DOT Baseline Performance Period Report. These targets, as submitted, can be found in Table 3 of this document.

Table 3 – Established H-GAC Region CMAQ-Focused 2- and 4-year Targets set in 2018

Performance Measure	2-Year Target	4-Year Target
Emissions – NO _x	1,419.426	1,883.294
Emissions - VOC	169.301	200.809

Assessment of Two-Year Target Progress

In 2020, at the mid-point of the first performance period, H-GAC staff began to analyze the emission reductions attributable to TIP projects that let within the years 2019 and 2020 and were reported to the Federal Highway Administration’s (FHWA) CMAQ Public Access System. Based on these projects, staff was able to compare the emissions reduction targets formulated in 2018 with the actual emission reduction performance of regional CMAQ projects. These results can be found in Table 4.

Table 4 – Established H-GAC Region CMAQ-Focused 2-Year Targets (2019-2022)

Performance Measure	2-Year Target	2-Year Progress	2-Year Delta
Emissions – NO _x	1,419.426	158.319	(1,261.107)
Emissions – VOC	169.301	52.010	(117.291)

There has been significantly less progress on the initial two-year target than was anticipated when the targets were initially set in 2018. As a result, the Houston region was unable to meet these two-year targets. This variance can be attributed to several factors:

- Letting Date Variance: Due to the formulation of the performance measures, all emission reductions attributed to any given project are counted in the year the project is initially obligated. As a result of this, approximately 825 kg/day of targeted NOx and 22.9 kg/day of targeted VOC were lost due to projects being unexpectedly let in 2018. The largest of these rescheduled projects is H-GAC's Clean Vehicles Program, which accounts for 822.66 kg/day of NOx and 22.46 kg/day of VOC emission reductions and was obligated in 2018 rather than 2019 as anticipated.
- Project Delays: Similarly, one of our Transportation Improvement Plan projects was delayed until a later year which removed it from this analysis. This accounted for 0.07 kg/day of NOx emissions reductions and 0.02 kg/day of VOC emissions reductions.
- Funding Category Changes and Project Cancellations: Finally, a small portion of the emissions reduction decreases are the result of four projects that were either moved to a separate, non-CMAQ funding category or were canceled altogether by the project's sponsor. This set of projects resulted in 0.04 kg/day of NOx reductions and 0.01 kg/day of VOC reductions.

Following the completion, approval by H-GAC's Transportation Policy Council, and submission of the initial two- and four-year targets in September 2018, FHWA released guidance in January 2019 to assist with the development of CMAQ targets. This guidance recommended that MPOs and state DOTs should use the time frame of 2018 through 2021 rather than 2019 through 2022 as H-GAC utilized in our initial target estimates. Using the revised time frame recommended in the guidance would result in a significant increase in emissions attributable to progress towards meeting the two-year performance target. Calculating the two-year target progress from 2018 through 2021 would have resulted in two-year progress of 919.445 kg/day of NOx and 68.570 kg/day of VOC.

Revisions to Four-Year CMAQ Targets

Due to lower than expected progress towards meeting the two- and four- year targets, it is necessary to revise our initial four-year targets downwards to reflect possible outcomes. First, this revision will revise the time frame for the remainder of the performance period. This revised range will include the years 2018 through 2021 to match the range recommended by the FHWA guidance that was not available during the initial 2018 development of the targets. Additionally, rather than base this revised four-year target on a direct accounting of planned projects as was done initially, H-GAC has used a revised methodology that was devised in conjunction with the Texas Department of Transportation and other Metropolitan Planning Organizations within Texas. This new methodology takes the variability of regional transportation projects into account. The revised four-year target uses a combination of verified outcomes from 2018 and 2019, as reported to the FHWA CMAQ Public Access System, as well as an estimate of future project outcomes derived from an average of Houston-Galveston region CMAQ projects funded over the last four full fiscal years between 2016 and 2019. This average was then doubled to determine an estimate of CMAQ-funded emissions reductions for fiscal years 2020 and 2021. Finally, the results from 2018 and 2019 were added to the averages for 2020 and 2021 to determine an estimated revised four-year target. Finally, this estimate is reduced by approximately 65% to take into account anticipated annual improvements to regional emissions due to on-road fleet turnover. The revised four-year target resulting from this analysis can be found in Table 5.

Table 5 – Revised H-GAC Region CMAQ-Focused 4-Year Targets (2018-2021)

Performance Measure	Original 4-Year Target	Revised 4-Year Target
Emissions – NO _x	1,883.296	1,429.077
Emissions – VOC	200.811	234.604

Description of CMAQ Projects

The Houston-Galveston Area Council coordinates with local stakeholders to select CMAQ projects for deployment in the Houston-Galveston-Brazoria ozone nonattainment area. These projects are selected to meet the program goals of reducing congestion and/or reducing emissions of ozone precursor pollutants. Emissions estimates for these projects are estimated by H-GAC using methodologies developed as part of the Texas Guide to Accepted Mobile Source Emission Reduction Strategies (MOSERS). In cases where no practical MOSERS methodology exists, verified past emission reduction performance is used to create an emissions reduction estimate. The results from these analyses are then uploaded by TxDOT into the CMAQ Public Access System upon the obligation of funding to projects and are accounted for in the expected benefits outlined in the table below. To simplify reporting, projects are grouped in the table based on general categories H-GAC uses to report project types in the TIP.

H-GAC is not required to report benefits for pollutants other than VOC and NO_x. As such, the table below reports only on these pollutants. Benefits for later years in the reporting period tend to be lower than earlier years due to regional fleet turnover. Table 6 shows the projects that have been obligated and were included in the CMAQ Public Access System for years 2018 and 2019. Table 7 shows the projects that have been programmed into the Transportation Improvement Program for the years 2020 and 2021 and are expected to contribute to the Houston region’s progress towards meeting the revised four-year targets.

Table 6 – FY2018 and FY2019 Obligated CMAQ Projects in the Houston-Galveston Region (as reported in CMAQ Public Access System)

Project Type	MPO ID	Project Description	Year of CMAQ Obligation	NOx Benefit (kg/day)	VOC Benefit (kg/day)	PHED Benefit	Non-SOV Benefit
Traffic Flow Improvements	17043	US 90 ITS Implementation	2018	0.98	0.19	Yes – reduces peak hour delay	No
Traffic Flow Improvements	17042	IH 10 ITS Implementation	2018	1.788	0.26	Yes – reduces peak hour delay	No
Air Quality	14723	H-GAC Commuter and Transit Pilot Program Implementation	2018	11.53	17.26	Yes – reduces peak hour delay	Yes – Increases non-SOV travel
Air Quality	17127	H-GAC Clean Vehicles Program Implementation	2018	822.66	22.46	Yes – reduces peak hour delay	No
Pedestrian/Bicycle	16126	Hills Bayou Trail Construction	2018	0.024	0.041	Yes – reduces peak hour delay	Yes – Increases non-SOV travel
Traffic Flow Improvements	17027	Fairmont Pkwy. ITS Implementation	2018	0.635	0.155	Yes – reduces peak hour delay	No
2018 Emissions Total				837.617	40.366		
Project Type	MPO ID	Project Description	Year of CMAQ Obligation	NOx Benefit (kg/day)	VOC Benefit (kg/day)	PHED Benefit	Non-SOV Benefit
Air Quality	14727	H-GAC Commute Solutions Program	2019	11.53	17.26	Yes – reduces peak hour delay	Yes – Increases non-SOV travel

Air Quality	11717	Regional METRO Star vanpool operations	2019	31.68	6.54	Yes – reduces peak hour delay	Yes – Increases non-SOV travel
Air Quality	17124	H-GAC Travel Demand Management Marketing, Education and Public Outreach	2019	69.55	3.75	Yes – reduces peak hour delay	Yes – Increases non-SOV travel
Traffic Flow Improvements	17062	Regional ITS Implementation	2019	1.75	0.43	Yes – reduces peak hour delay	No
Pedestrian/Bicycle	7814	Spring Creek Hike & Bike Trail Construction	2019	0.318	0.224	Yes – reduces peak hour delay	Yes – Increases non-SOV travel
2019 Emissions Total				81.828	28.204		

Table 7 – Expected Benefits of FY2020 and FY2021 Programmed CMAQ Projects in the Houston-Galveston Region

Project	MPO ID	Project Description	Year of Anticipated CMAQ Obligation	NO _x Benefit (kg/day)	VOC Benefit (kg/day)	PHED Benefit	Non-SOV Benefit
Pedestrian/Bicycle	16203	Construct On-Street Bicycle Network	2020	1.58	2.68	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Traffic Flow Improvements	17044	Install New ITS Equipment and Infrastructure on SH 6 Part 1	2020	0.11	0.03	Yes – reduces peak hour delay	Yes – increases non-SOV travel

Traffic Flow Improvements	18646	Install New ITS Equipment and Infrastructure on SH6 Part 2	2020	0.11	0.03	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Traffic Flow Improvements	17064	Install New ITS Equipment and Infrastructure on Interstate 45	2020	1.88	0.03	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Air Quality	17128	Regional METRO Star vanpool operations	2020	31.68	6.54	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Pedestrian/Bicycle	18013	Projects to improve and expand pedestrian experience	2020	6.77	4.46	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Air Quality	18017	Improvement to regional Park & Ride facilities	2020	2.69	3.22	Yes – reduces peak hour delay	Yes – increases non-SOV travel
2020 Emissions Estimates				112.81	27.60		

Project	MPO ID	Project Description	Year of Anticipated CMAQ Obligation	NOx Benefit (kg/day)	VOC Benefit (kg/day)	PHED Benefit	Non-SOV Benefit
Pedestrian/Bicycle	7814	Construct Multiuse Hike & Bike Trail	2021	0.32	0.22	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Transit	11760	Regional METRO Star vanpool operations	2021	31.68	6.54	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Transit	11762	Regional METRO Star vanpool operations	2021	31.68	6.54	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Traffic Flow Improvements	11916	Regional Freeway Incident Management and Towing Program	2021	11.87	2.33	Yes – reduces peak hour delay	No
Air Quality	12092	H-GAC Clean Vehicles Program Implementation	2021	395.39	10.79	Yes – reduces peak hour delay	No
Traffic Flow Improvements	14173	Reconstruct Roadway to Add Turning Lane and Pedestrian/Bicycle Accommodations	2021	3.07	0.75	Yes – reduces peak hour delay	Yes – increases non-SOV travel

Pedestrian/Bicycle	15321	Projects to improve and expand pedestrian experience in Downtown Houston	2021	0.11	0.03	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Traffic Flow Improvements	17051	Add Traffic Flow Improvement and Pedestrian Bicycle Facilities on FM 1960	2021	0.16	0.02	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Traffic Flow Improvements	17062	Construct Wireless Traffic Signal Communication System	2021	1.75	0.43	Yes – reduces peak hour delay	No
Pedestrian/Bicycle	17119	Projects to improve and expand pedestrian experience in South Houston	2021	0.08	0.02	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Transit	17135	Regional vanpool operations	2021	16.50	3.41	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Transit	17141	Regional vanpool operations	2021	16.50	3.41	Yes – reduces peak hour delay	Yes – increases non-SOV travel

Transit	18012	Regional transit expansion to downtown Houston	2021	2.51	0.01	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Traffic Flow Improvements	18026	Upgrade ITS Equipment in City of Sugarland	2021	2.22	0.61	Yes – reduces peak hour delay	No
Transit	18163	Implement Regional Transit Fare Collection System	2021	0.50	0.34	Yes – reduces peak hour delay	Yes – increases non-SOV travel
Transit	18361	Regional vanpool operations	2021	16.50	3.41	Yes – reduces peak hour delay	Yes – increases non-SOV travel
2021 Emissions Estimates				530.83	38.87		