



CENTRAL TEXAS REGIONAL
MOBILITY AUTHORITY

**INNOVATION
RESEARCH BRIEF**

MoPac Express Lanes Energy-Emissions Analysis

STUDY BACKGROUND

In spring 2019, the Capital Area Council of Governments (CAPCOG), with assistance from Capital Metropolitan Transportation Authority (CapMetro), the Texas Transportation Institute (TTI), and the North Central Texas Council of Governments (NCTCOG), completed a study to evaluate the emissions and fuel consumption impact of the MoPac (Texas State Highway Loop 1) Express Lanes.

OBJECTIVES

- Determine the emissions and fuel consumption impact by assessing the impact of changes in vehicle speed.
- Assess the mode shift impact associated with the use of MoPac Express Lanes by CapMetro Express commuter buses.

The purpose of the research brief is to summarize the findings and conclusions of a study by the Mobility Authority to evaluate future technology and innovative concepts.

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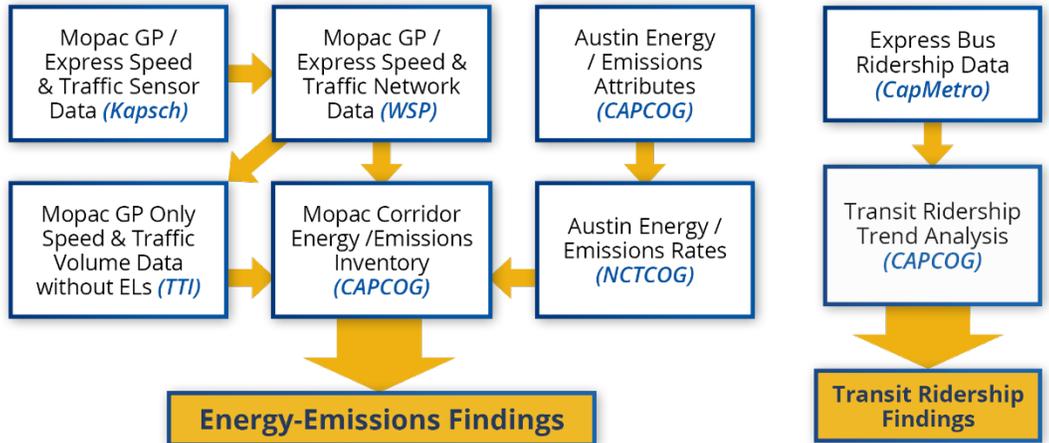


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Methodology

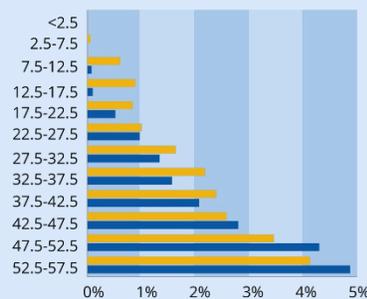


Speed Distribution

The **Congested** graph shows that when congestion is present in both general purpose (GP) and express (EL) lanes, the ELs tend to carry more trips at higher speeds than the GP lanes. Both graphs show more EL traffic operates at higher speeds than the GP lanes.

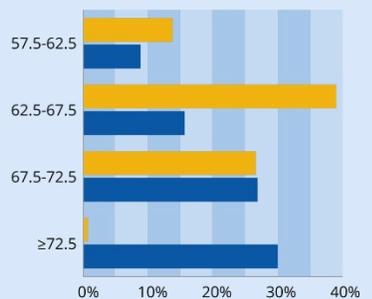
Congested:

Percentage of trips vs. speed



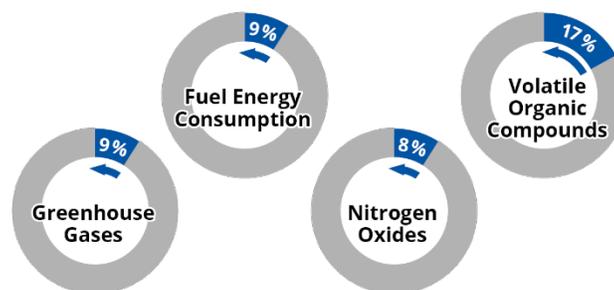
Uncongested:

Percentage of trips vs. speed



Energy-Emissions Reduction due to Reduced Congestion

Over a 61 day period, the study found that reductions in VOC and greenhouse gas (carbon dioxide) — the more important pollutants — are strongly related to reduced fuel consumption. The 8% reduction in NOx is important to regional air quality conformity.



Monetized Daily Benefits

The magnitude of these monetary savings are similar to the daily tolls collected by the express lanes — these two benefits alone reimburse Mopac Expressway users at large with tangible benefits funded by express lane users.

\$23,507

REDUCED FUEL CONSUMPTION

+ \$14,245

REDUCED EMISSIONS (HEALTH BENEFITS)

\$37,752

TOTAL COST SAVINGS

MoPac Express Lanes Energy-Emissions Analysis



KEY FINDINGS

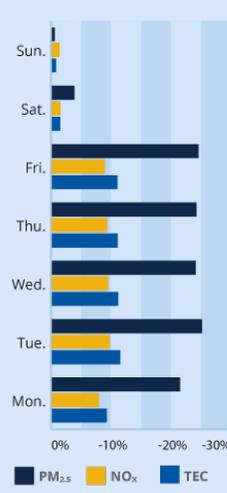
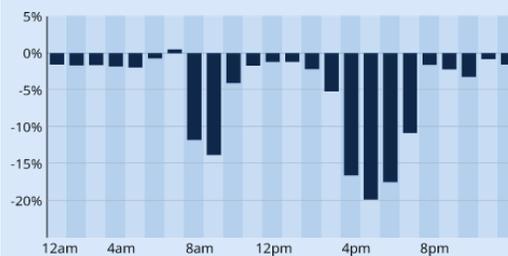
01. CO Overall, vehicles moved along the Express Lanes an average of 8 mph higher than speeds on the General Purpose lanes across the entire 61-day study period.
02. Compared to a “no Express Lane” scenario” MoPac with the Express Lanes achieved reductions in fuel consumption and emissions for all pollutants analyzed, particularly on weekdays.
03. Routes using the Express Lanes had 24-29% increases in ridership in April and May 2018 over April and May 2017 levels.
04. Ridership on routes using the Express Lanes experienced even larger year-over-year increases after May 2018 – ranging from 52-63% from June – August and from 42 – 52% from September – December compared to the same months in 2017.
05. CAPCOG estimated that the Express Lanes shifted an average of 12,266 passenger miles per weekday from single-occupancy vehicle (SOV) commuting to transit.

SOURCE
2019 CAPCOG Emissions Summary

Statistic	From Speed Changes on MoPac	From Mode Shift to MetroExpress Buses	Total
VMT Reduced	0	12,265.68	12,265.68
CO Reduced (pounds/day)	544.08	102.65	646.73
NOX Reduced (pounds/day)	115.07	6.42	121.49
NH3 Reduced (pounds/day)	4.62	0.59	5.21
PM10 Reduced (pounds/day)	80.13	1.03	81.16
PM2.5 Reduced (pounds/day)	16.05	0.25	16.30
SO2 Reduced (pounds/day)	1.17	0.06	1.23
VOC Reduced (pounds/day)	24.30	6.92	31.22
CO2 Reduced (pounds/day)	180,499.65	9,701.31	190,200.96
Fuel Consumption Reduced (gallons of gas equivalent/day)	8,161.13	516.27	8,677.40

Reduction in Fuel Consumption by Hour of Day

Fuel consumption savings by time of day is greatest during the hours of the weekday peak periods. This graph shows typical AM peak reductions of 10-15% for two hours, and PM peak reductions of 15-20% for three hours.



Energy-Emissions Reduction due to Reduced Congestion

Weekday reductions are higher than weekends due to the difference in congestion levels, where the express lanes have the greatest impact.

CapMetro Express Bus Routes

More passengers taking Express Buses means fewer drivers on the road, which relates to emissions reductions. The ratio of 2018 passenger trips to 2017 passenger trips on Express buses shows an increase in ridership year-over-year.

