

For help accessing this document, email [NEI\\_Help@epa.gov](mailto:NEI_Help@epa.gov).

# COVID-19 Pandemic Effects on Vehicle Activity and Emissions

2023 International Emissions Inventory Conference  
September 26-29, 2023

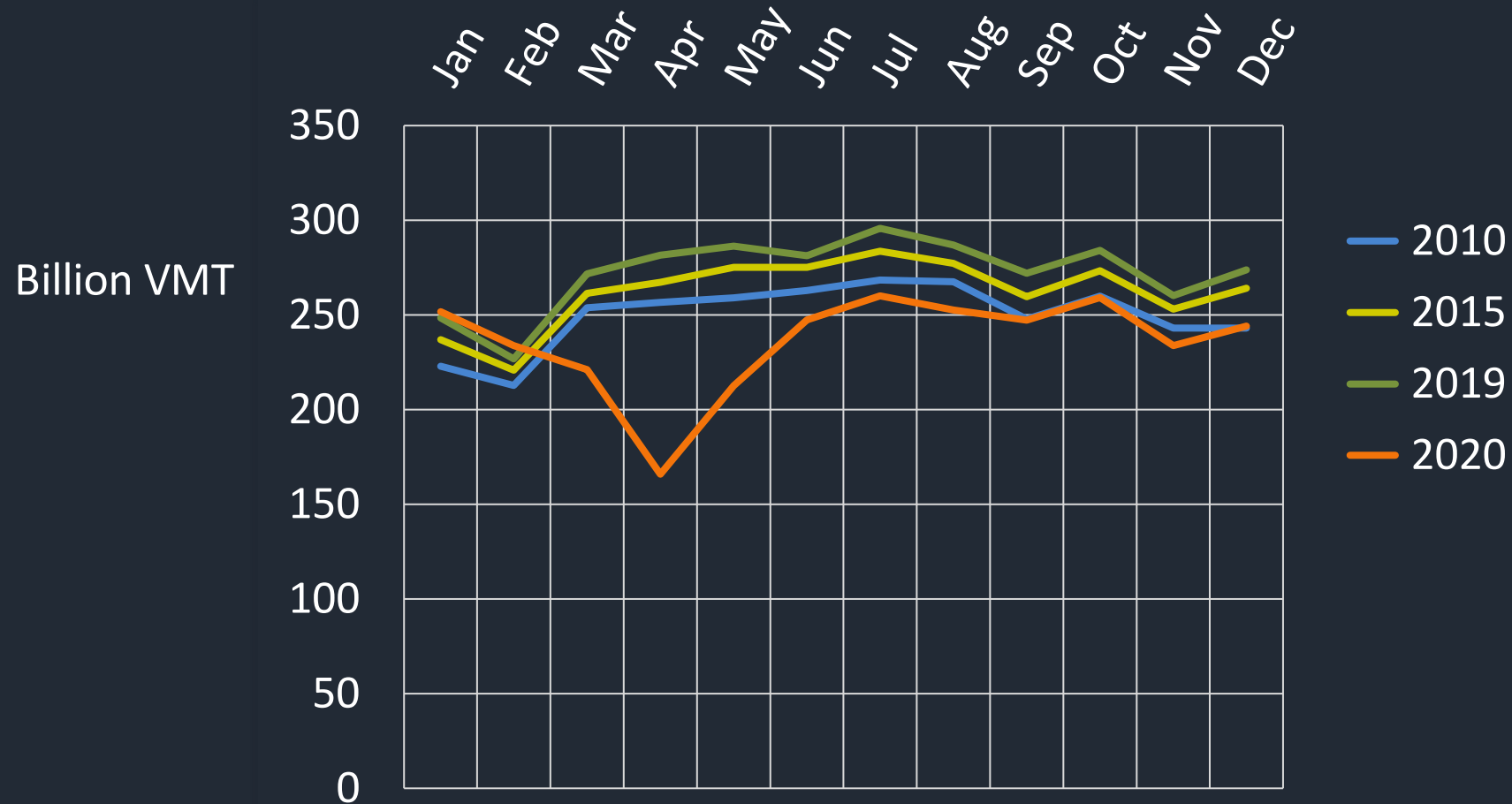
Allison DenBleyker, Henry Byoun, John Koupal, Ken Zhao,  
Cindy Palacios, ERG

Sarah Roberts, Alison Eyth, Janice Godfrey, U.S. EPA

Christine Allen, GDIT



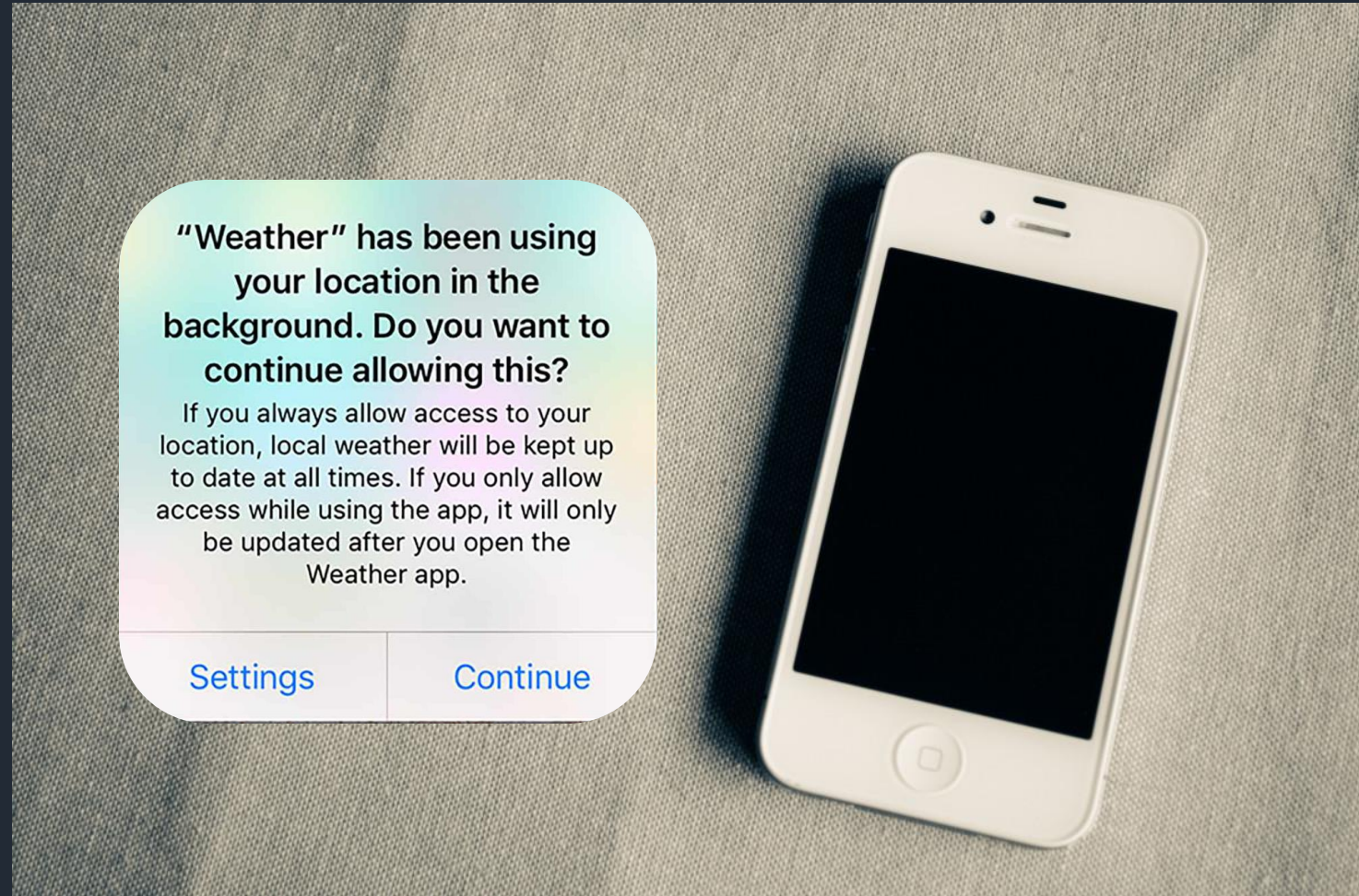
# National Vehicle-Miles Traveled



Source: FHWA Traffic Volume Trends

# A New Kind of Traffic Monitor

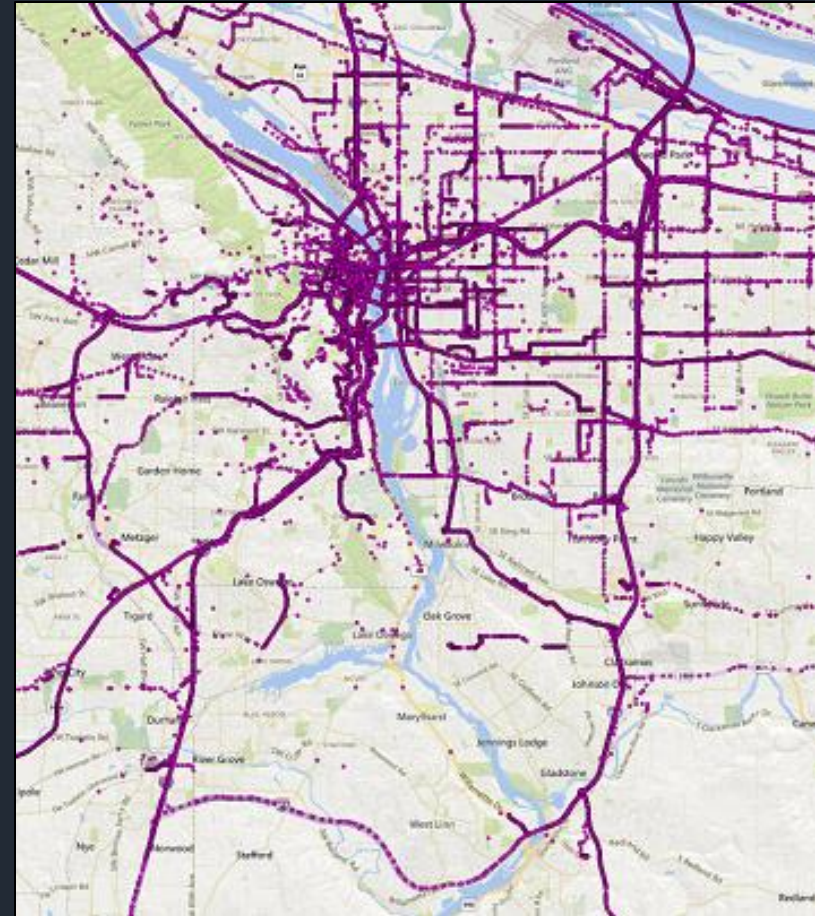
Location Based  
Services (LBS)





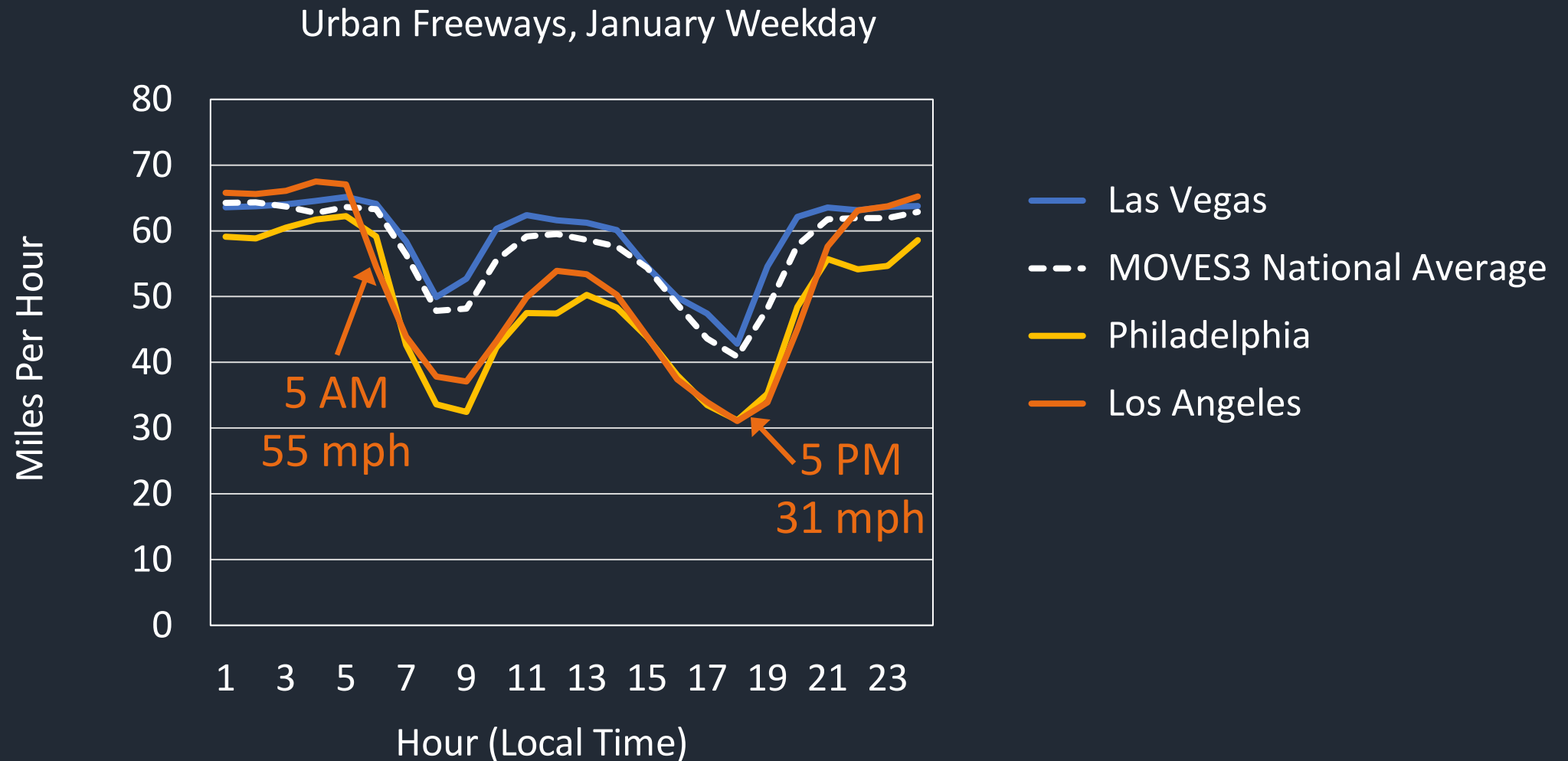
# The 2020 NEI and StreetLight Data

- Personal Vehicles (LBS)
- Medium-Duty and Heavy-Duty Trucks (fleet management systems)
- Pings assigned to road network
- Summaries of travel distance, time:
  - Month, 7 day types of week, 24 hours
  - Speed bins up to 100+ mph
  - Vehicle and Road Type
  - County



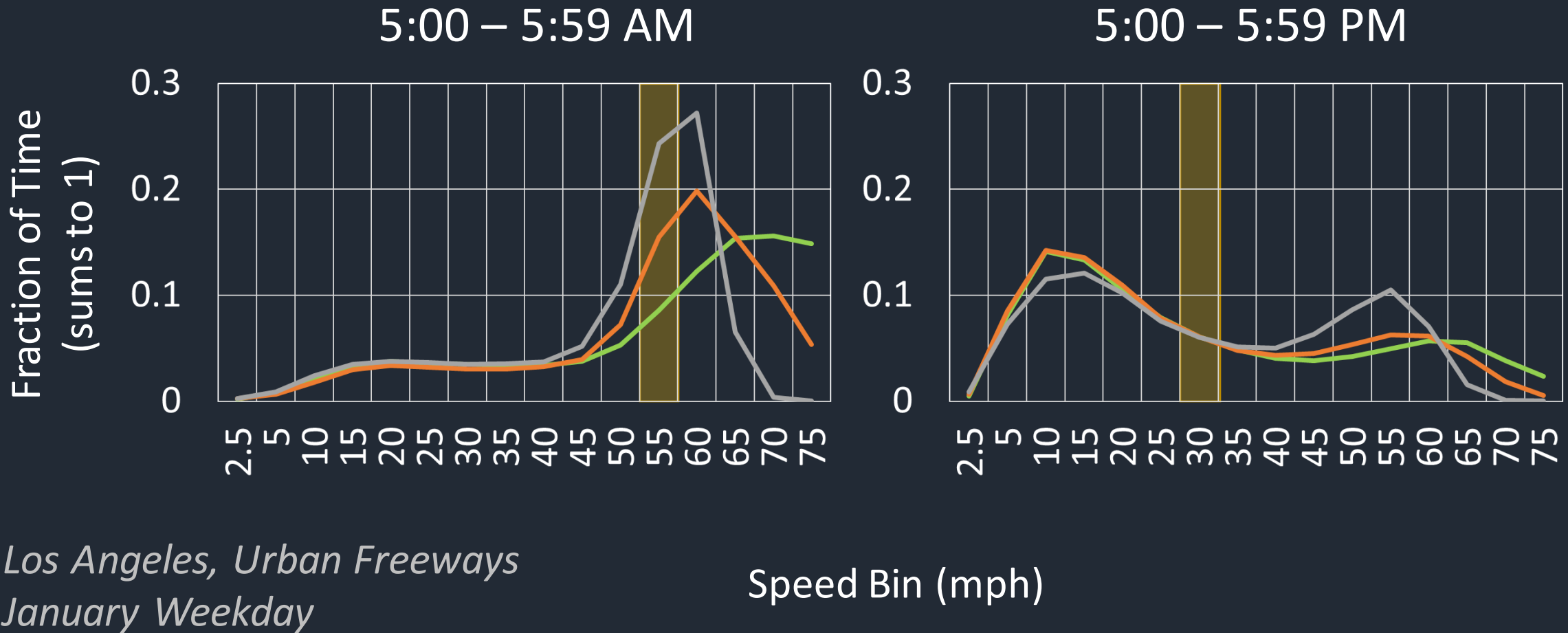
**STREETLIGHT DATA**  
Big Data for Mobility

# Pre-Pandemic Average Speeds by Area



# Pre-Pandemic Speed Distributions by Vehicle Class

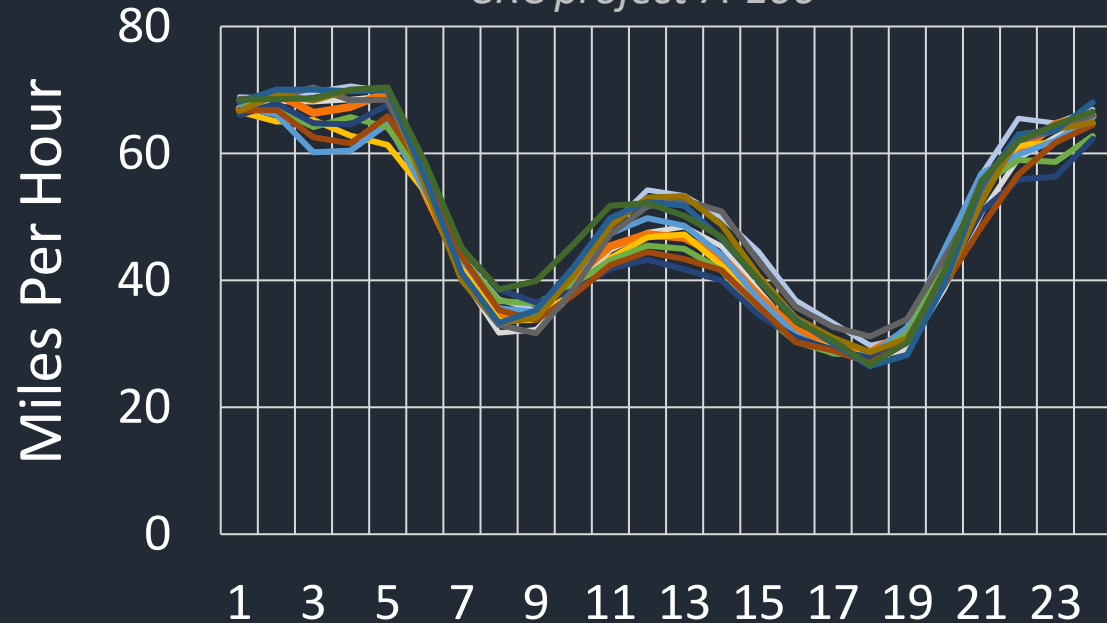
- Personal Vehicles (LBS)
- Commercial Trucks MD
- Commercial Trucks HD



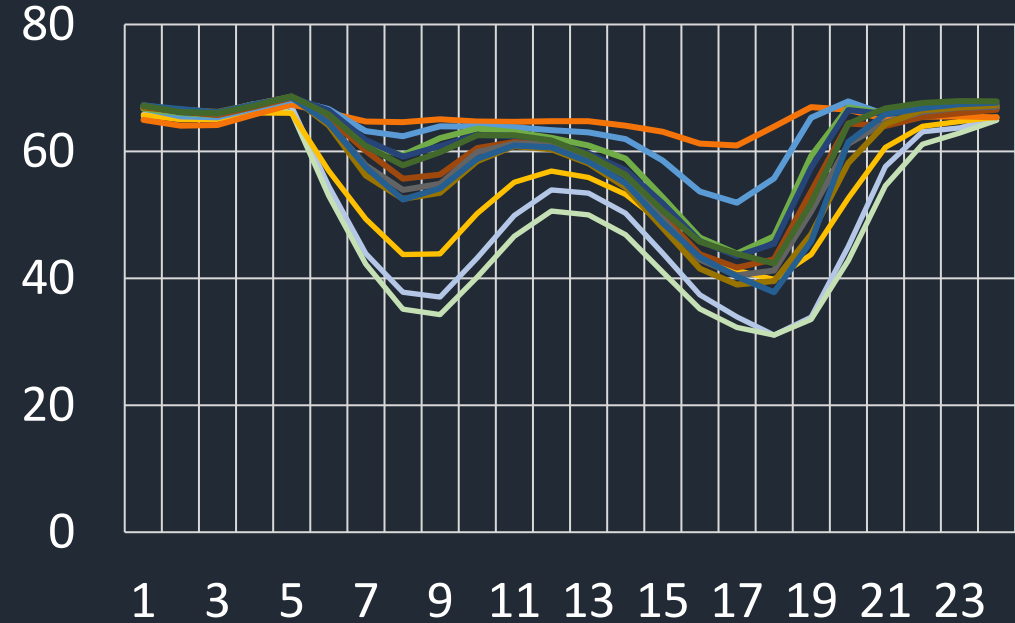
# Los Angeles Urban Freeway Average Speeds

2015-2016

*CRC project A-100*



2020



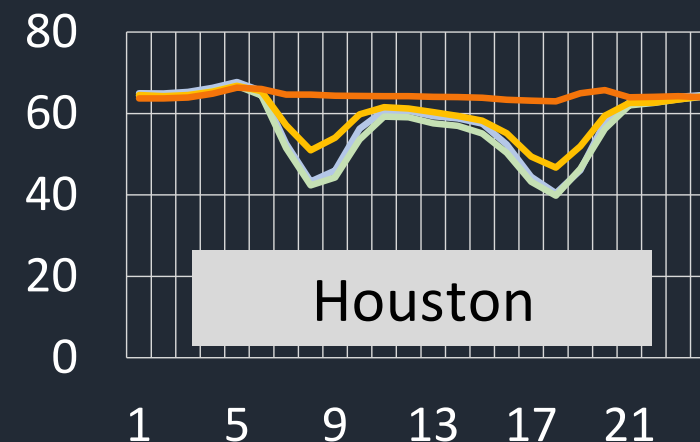
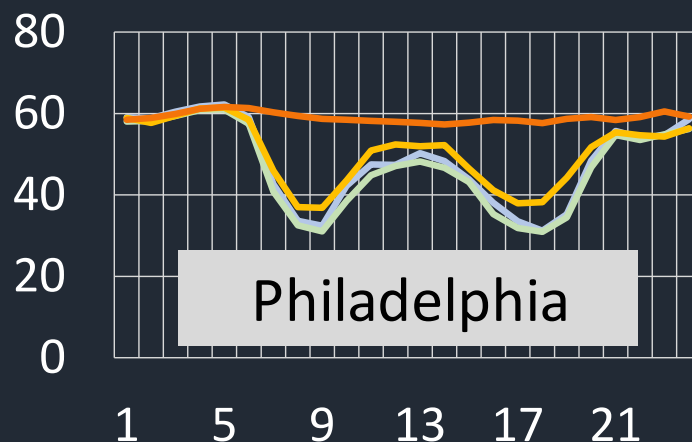
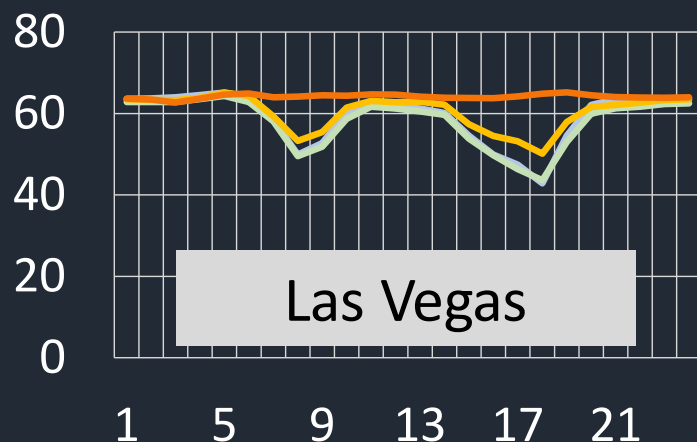
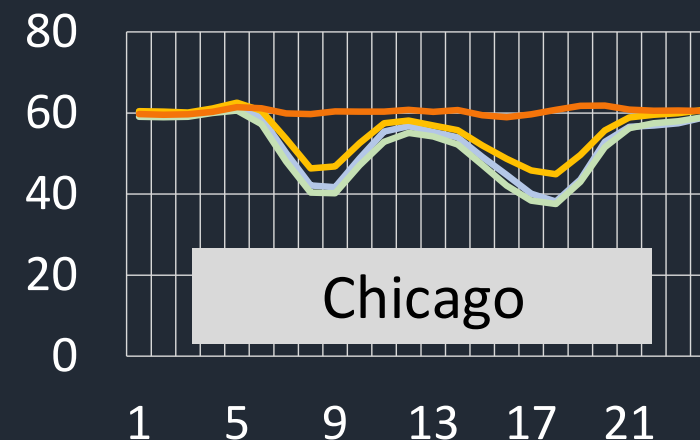
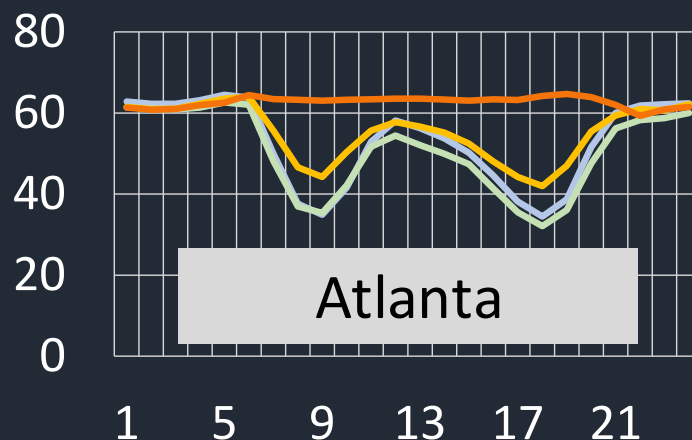
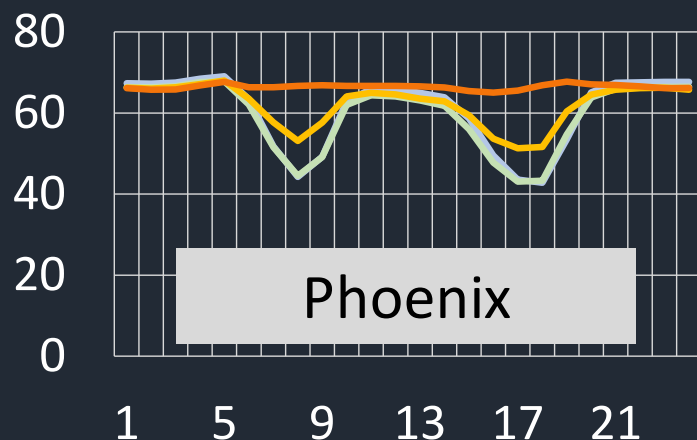
Jan  
Feb  
Mar  
Apr  
May  
Jun  
Jul  
Aug  
Sep  
Oct  
Nov  
Dec

Hour of Weekday (Local Time)

# Urban Freeways, Jan - Apr 2020

Jan  
Feb  
Mar  
Apr

Miles Per Hour



Hour of Weekday (Local Time)



# Emissions Sensitivity Results

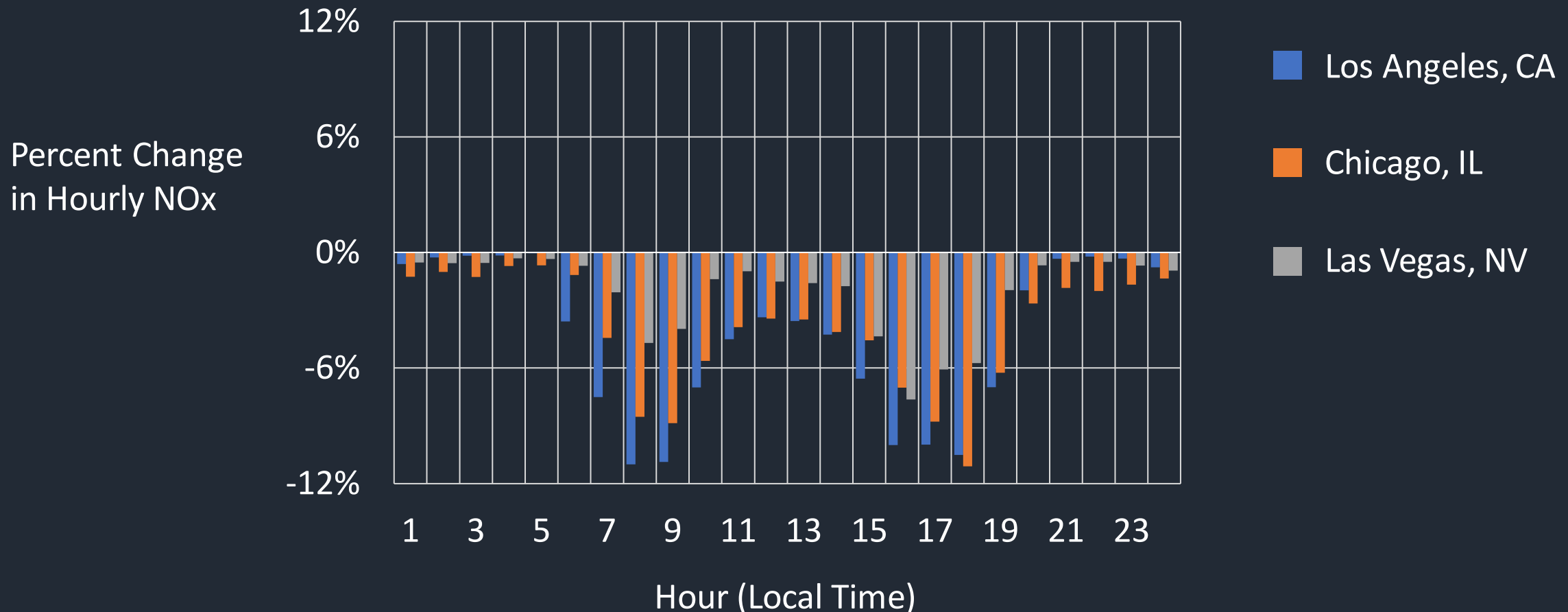
“Pandemic” case directly used month-specific data developed for 2020 NEI

“No Pandemic” case used January speeds in March through December

# On-road NOx Impact of Pandemic Speeds Alone

“No Pandemic” scenario used January 2020 Speeds

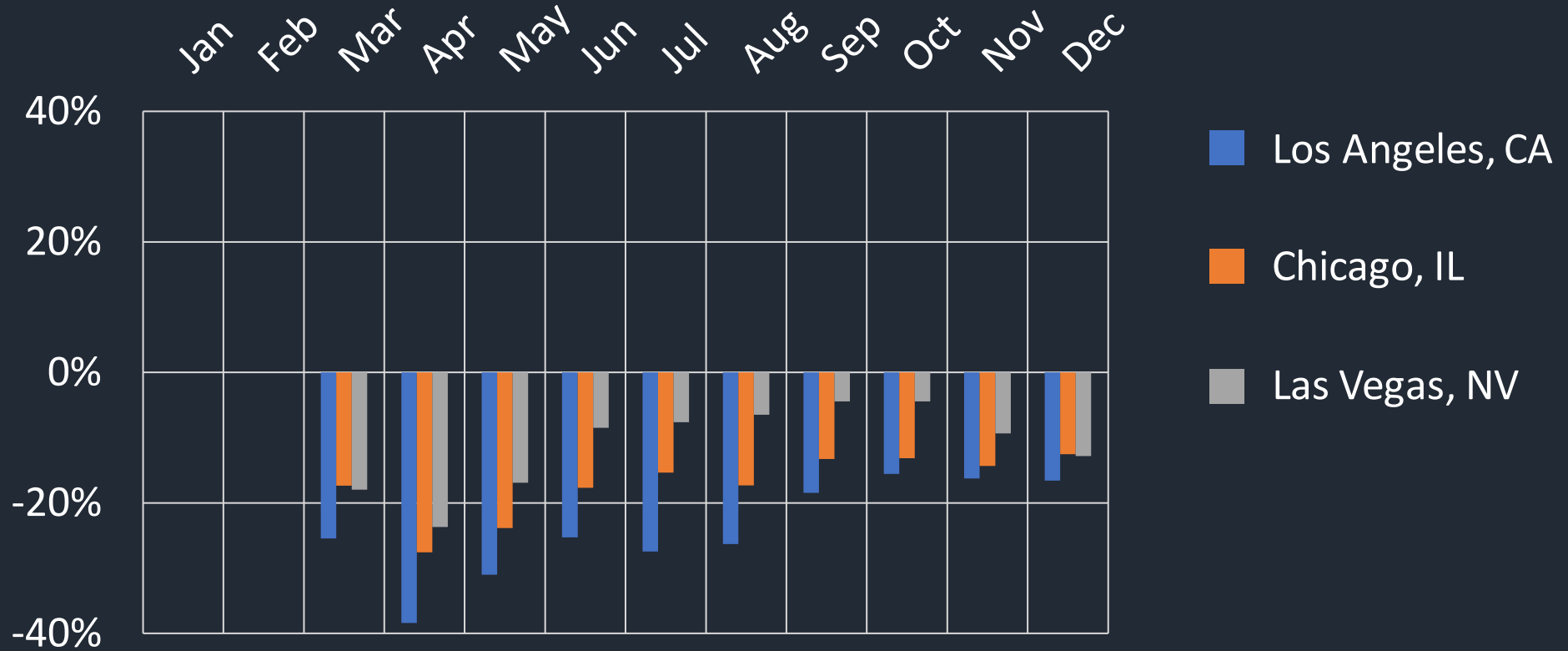
April Weekday, 2020



# On-road NOx Impact of Pandemic

“No Pandemic” scenario used January 2020 Speeds, projected 2020 VMT & population

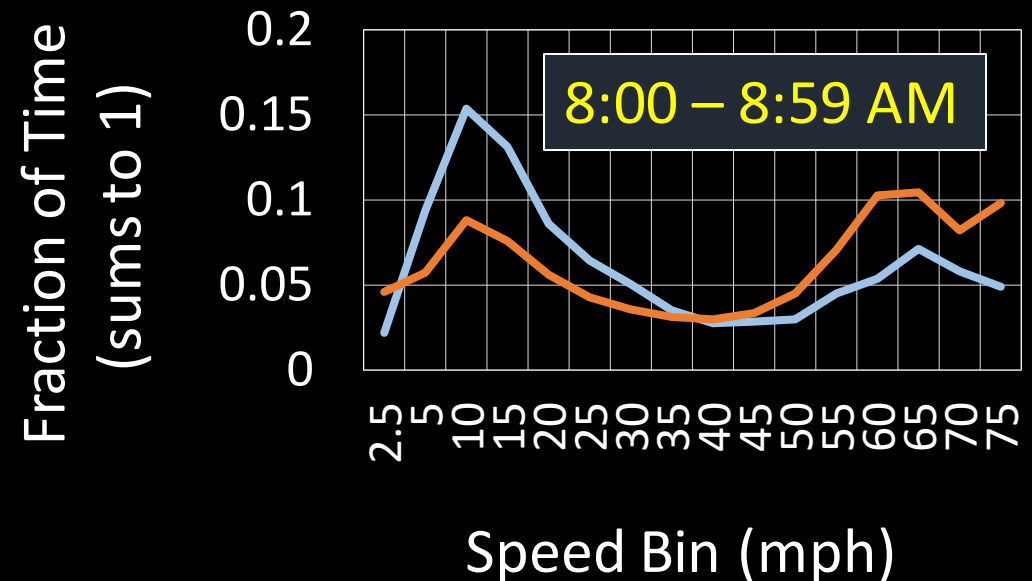
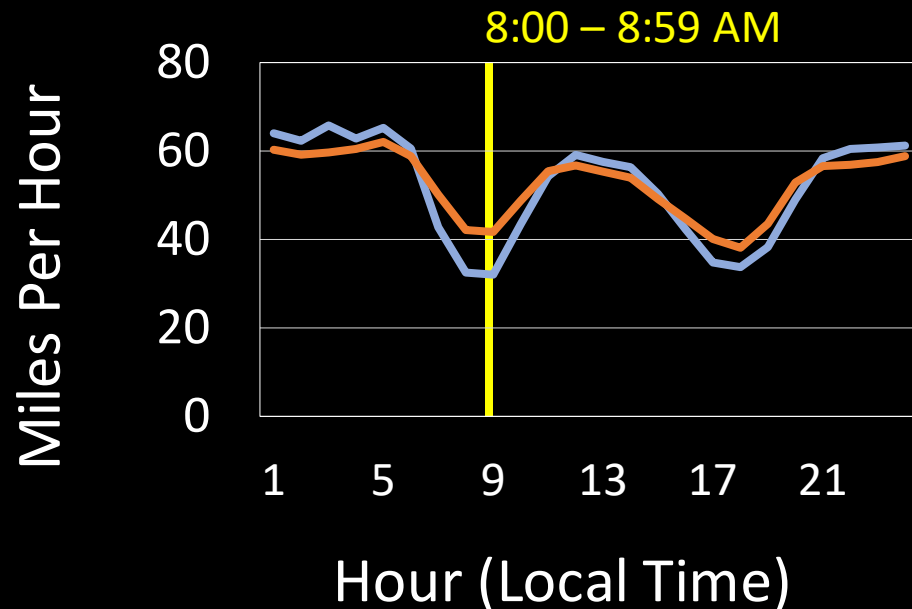
Percent Change  
in Monthly NOx



# Applicability of 2020 to Other Years?

- Late 2020 likely applicable for near-years
- Pre-pandemic months Jan/Feb more broadly useful
- ***Do speeds change over time?***

*Chicago Urban Freeways, January Weekday, LBS Data*





# Conclusions and Contact Information

- Smartphone location data a new source for vehicle activity
  - Produces MOVES inputs, model defaults
  - Additional detail available to study new questions:
    - Prevalence of high speeds > 75 mph ?
    - Do city/county speed distributions change over time?
- Stationary under-the-road monitors still important
  - Validate LBS data; total VMT by vehicle class
- 2020 NEI speed distributions available by county, month
  - Contact the EPA NEI Team (Janice Godfrey [Godfrey.Janice@epa.gov](mailto:Godfrey.Janice@epa.gov))
  - May optionally CC me [Allison.DenBleyker@erg.com](mailto:Allison.DenBleyker@erg.com)