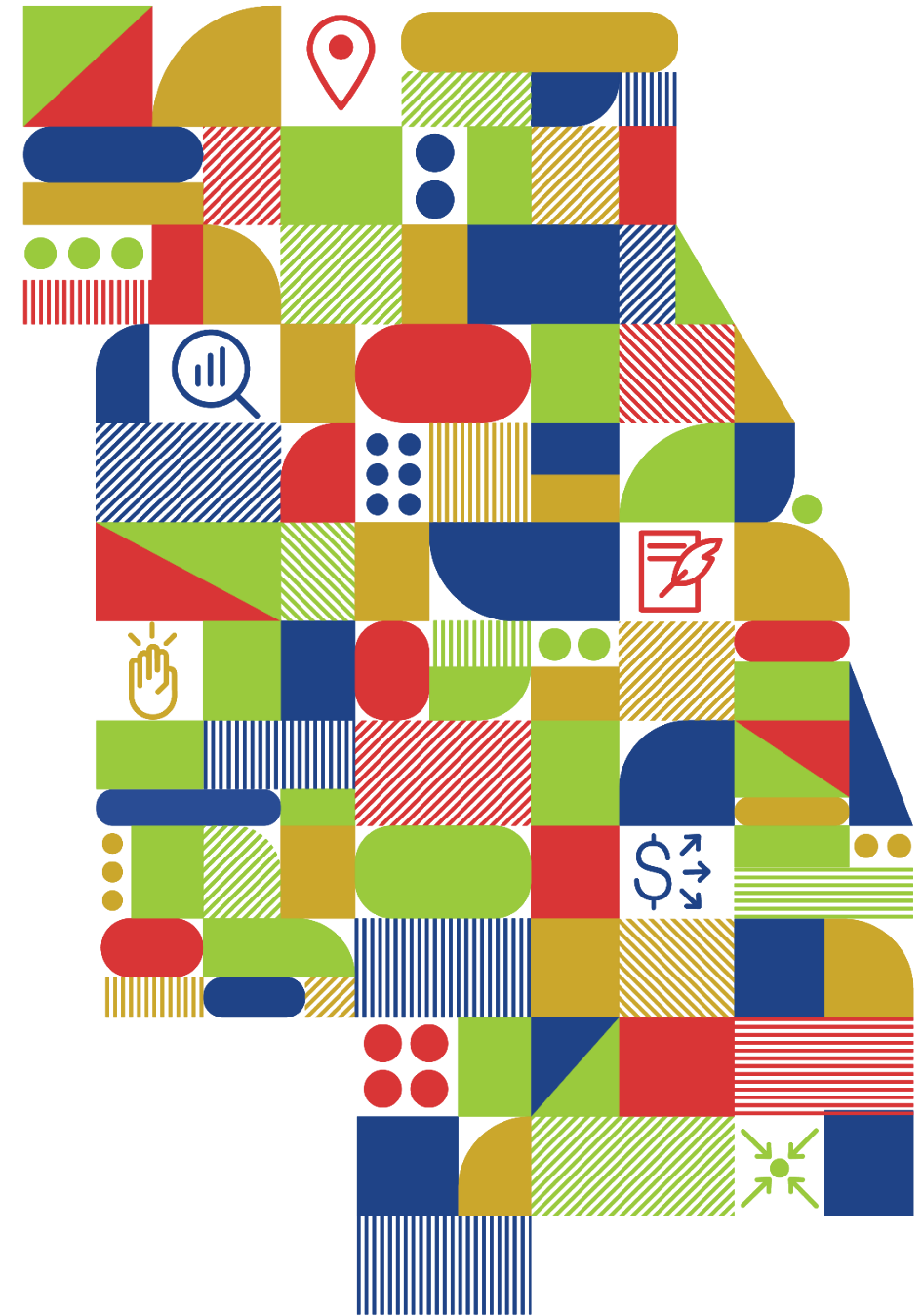




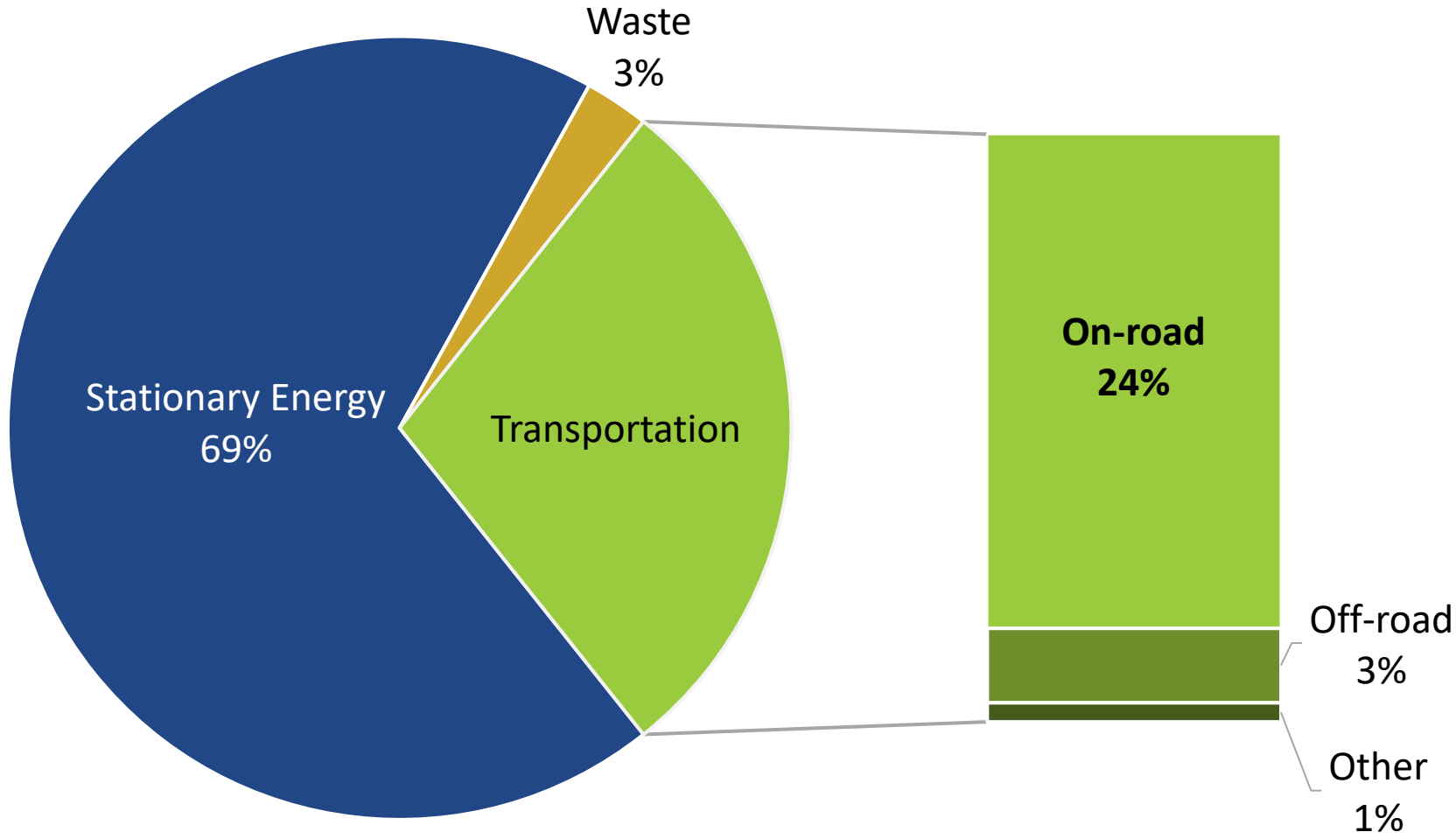
# On-road Greenhouse Gas Emissions

January 7<sup>th</sup>, 2021



# On-road emissions are nearly one-quarter of all emissions

2015 Greenhouse Gas Inventory. Total Emissions = 119.13 MMTCO<sub>2</sub>e.



# Emissions Modeling Process

## MOVES input files

Vehicle age distribution

Source Type Population

Fuel Type and Technologies

Meteorology Data

I/M Programs

CMAP

Travel Model

Vehicle Type VMT

Average Speed Distribution

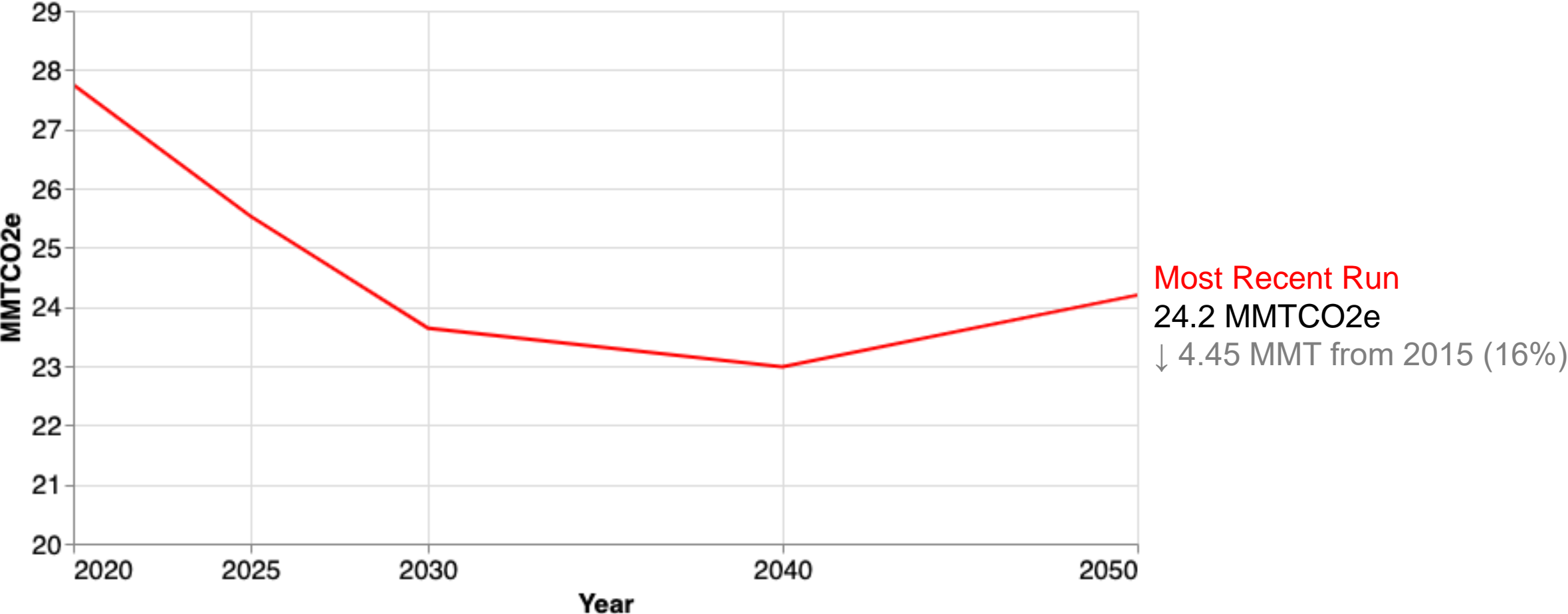
Road Type Distribution

Ramp Fraction



# Greenhouse gas emissions decrease 16% by 2050

Emissions by Year for Spring 2020 Conformity Run



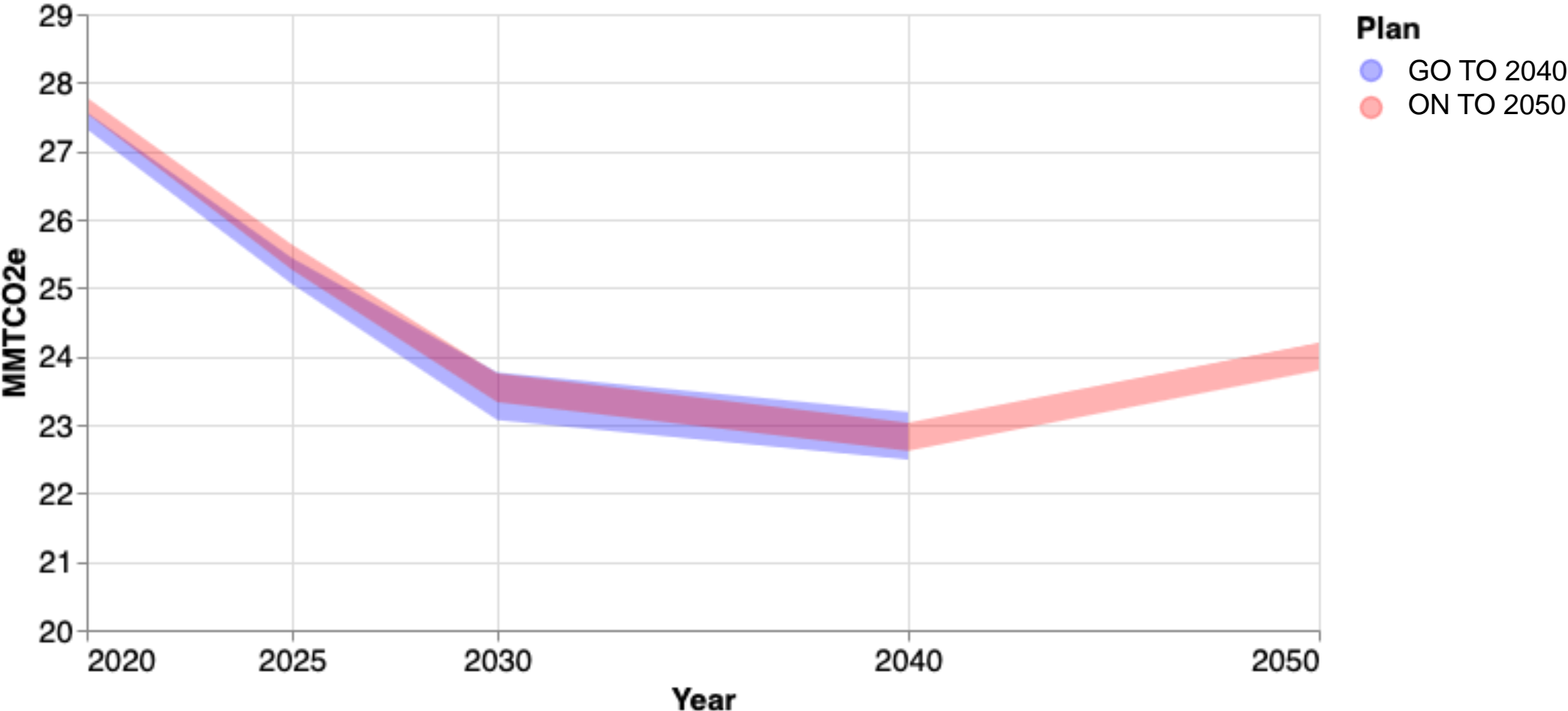
How do results vary  
across **conformity**  
**runs?**

# Emissions results are mostly consistent between Plans

ON TO 2050 runs show slightly higher results for earlier years.

Emissions by Year for 2016 – 2020 Conformity Runs grouped by Plan

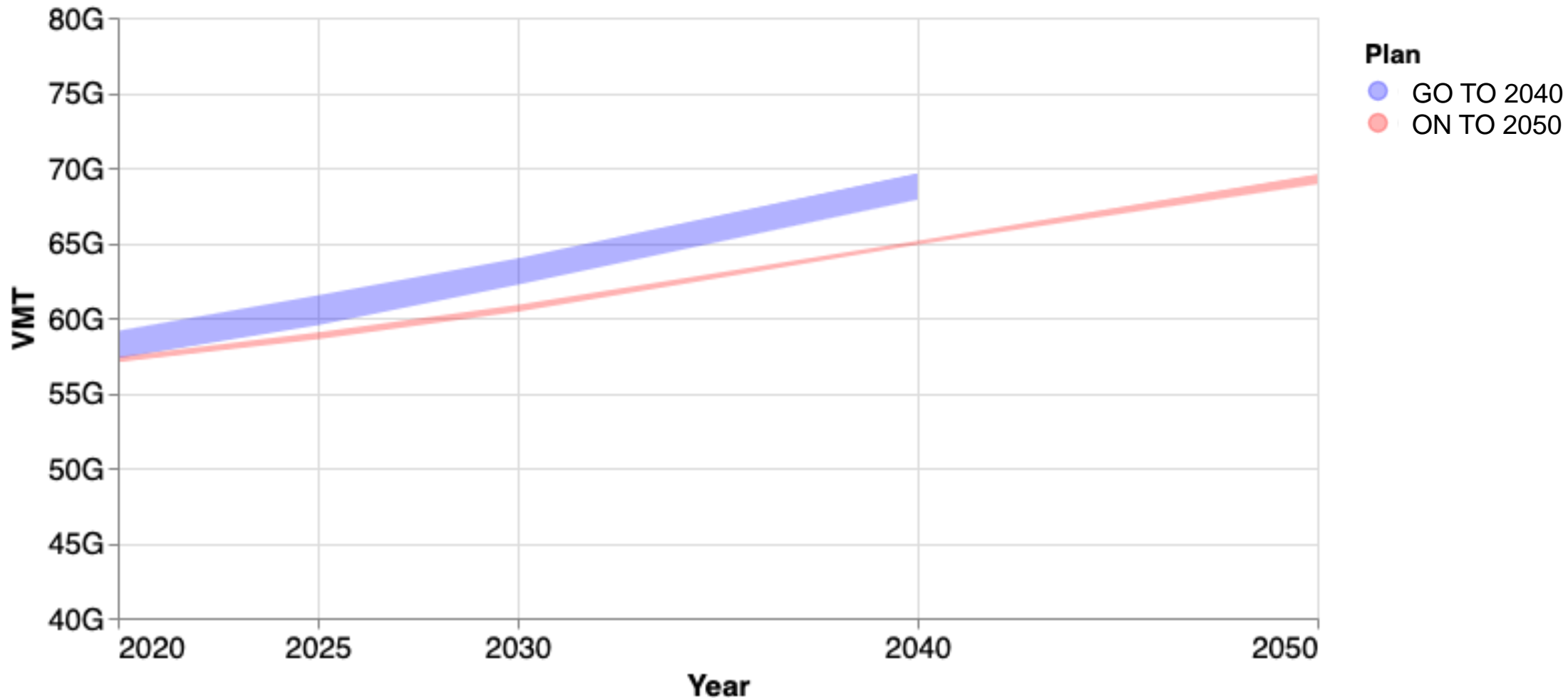
Results for each Plan are grouped together, and band shows the standard deviation extending from the mean for each year.



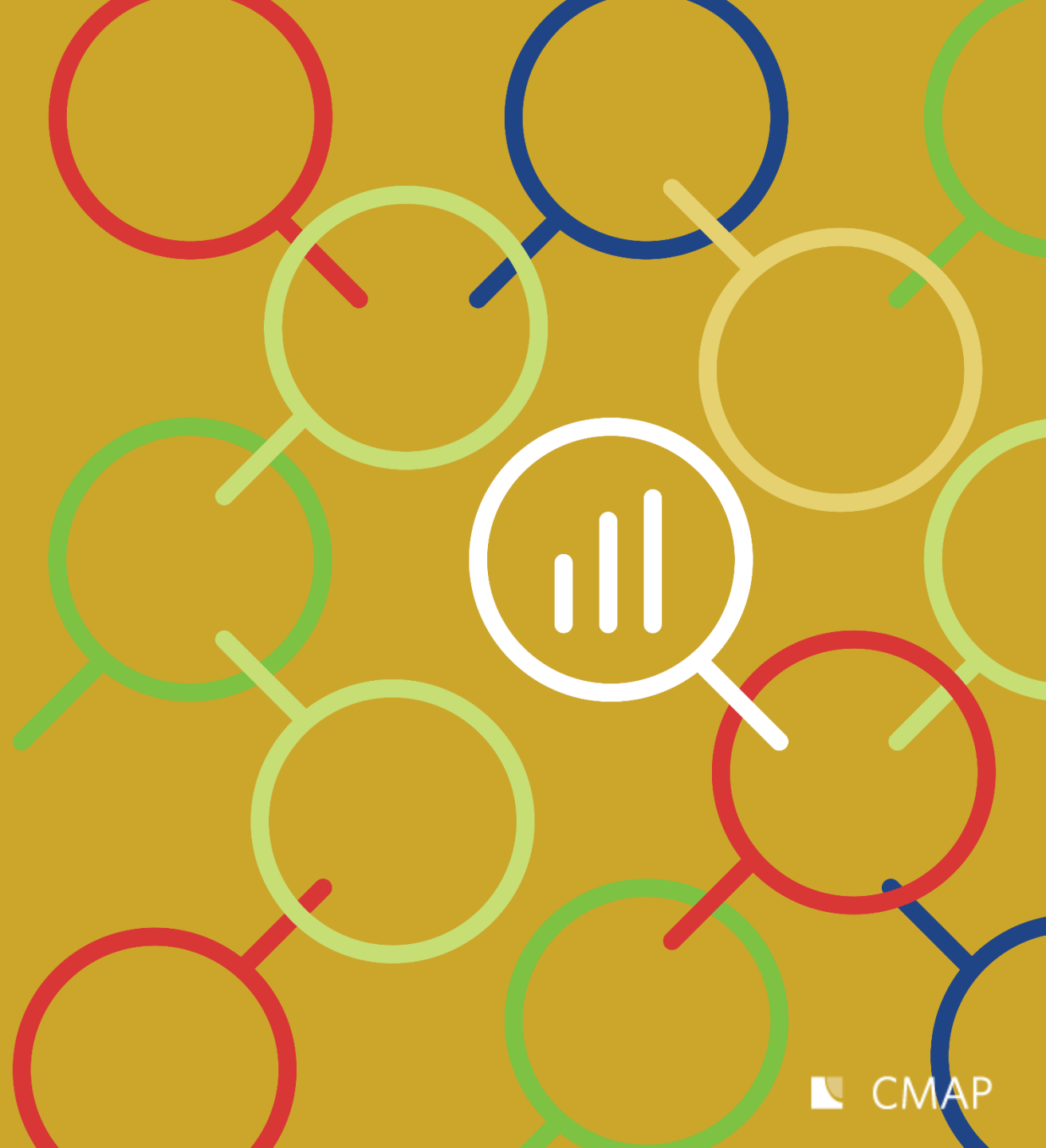
# Total VMT is higher for GO TO 2040 runs

VMT by Year for 2016-2020 Conformity Runs grouped by Plan

Results for each Plan are grouped together, and band shows the standard deviation extending from the mean for each year.



How do different  
**sources** contribute  
to total emissions?





# MOVES Source Types

## **Passenger car**

Sedans, coupes, compacts, and station wagons with the primary purpose of carrying passengers

## **Passenger truck**

Pickups, SUVs, and vans with the primary purpose of carrying passengers

## **Combination long-haul truck**

Truck-tractor towing at least one trailer with primary trip length >200 miles

## **Single-unit long-haul truck**

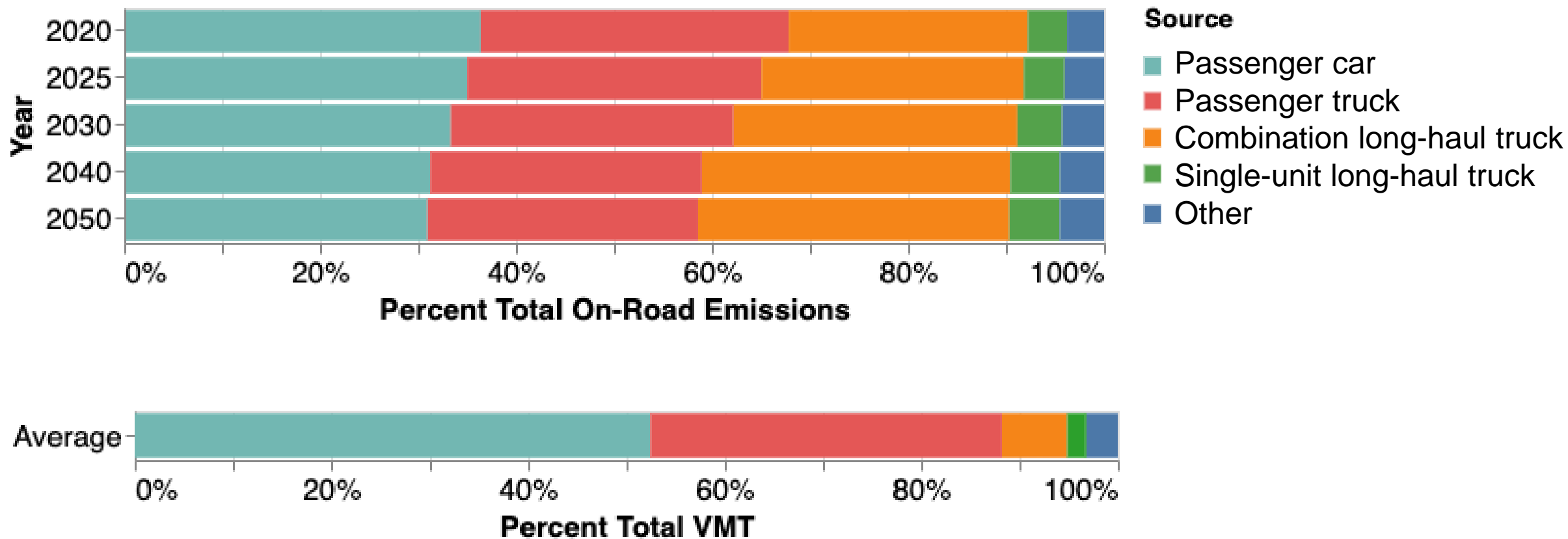
Single-frame truck with gross vehicle weight rating >10,000 lbs or with two axles and at least six tires ('dually') with primary trip length >200 miles

## **Other**

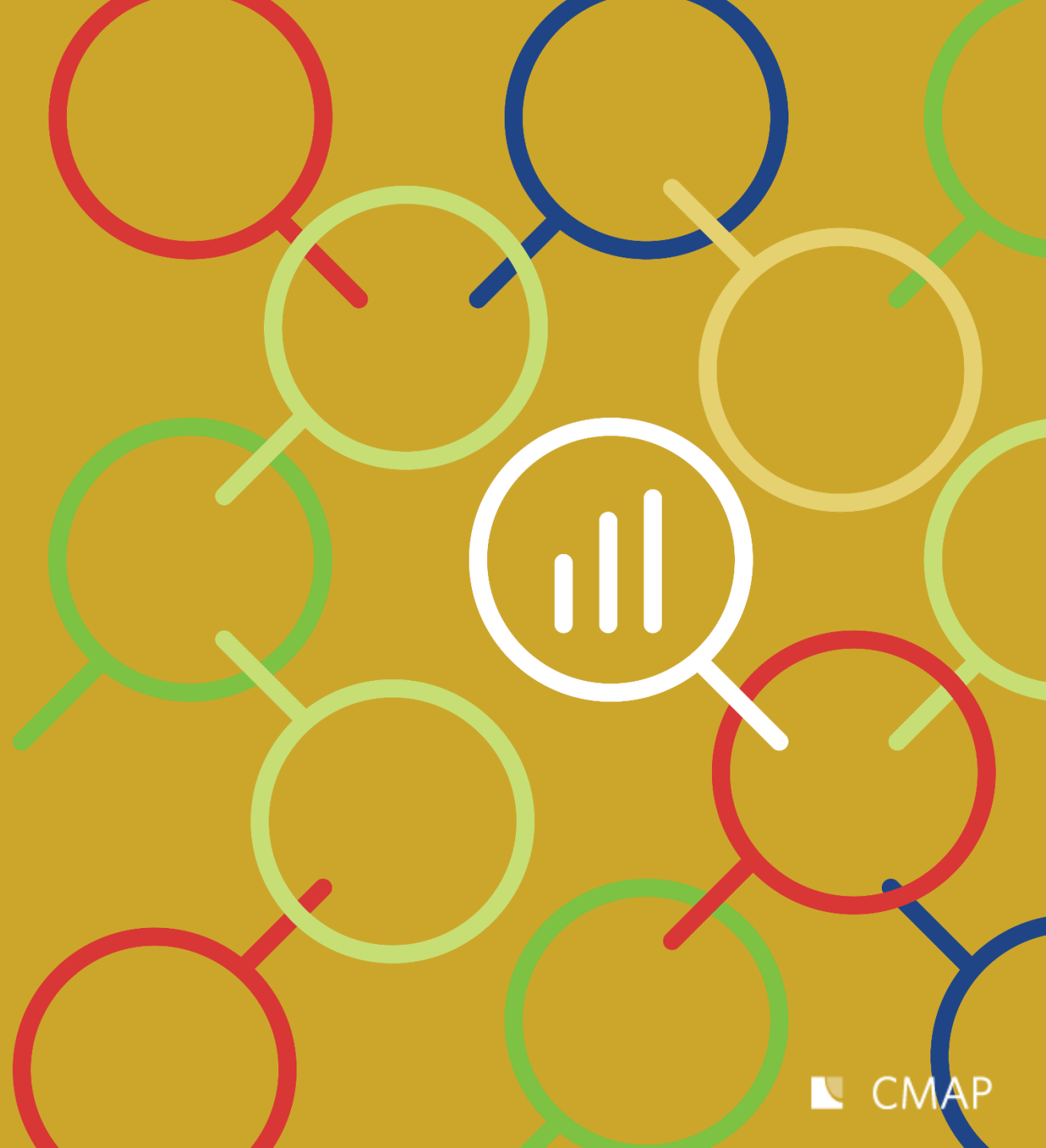
Light commercial truck, motorcycle, combination and single-unit short-haul trucks, transit bus, school bus, motor home, refuse truck

# Majority of emissions from Passenger Cars, Passenger Trucks, and Combination Long-haul Trucks

Percent Total Emissions by Year by Source Type for Spring 2020 Conformity Run  
Majority of VMT is from Passenger Cars and Trucks (bottom)

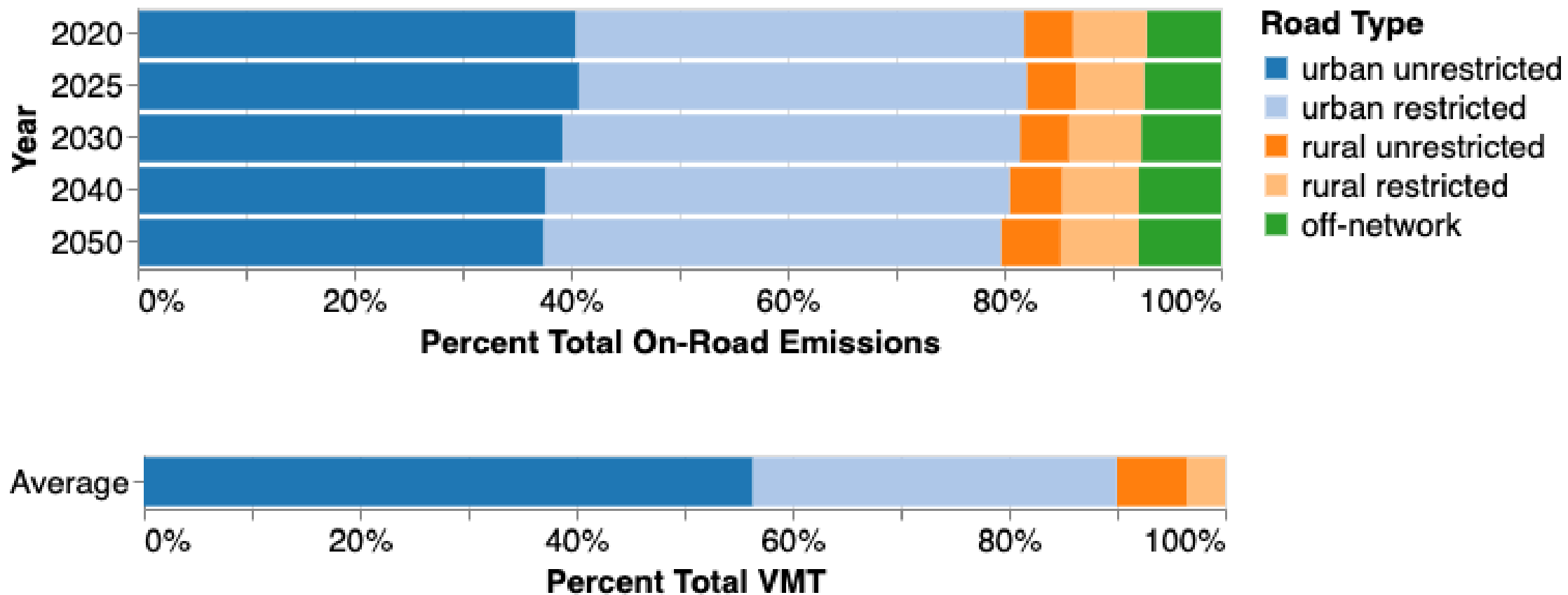


How are emissions spread across different **facility types**?

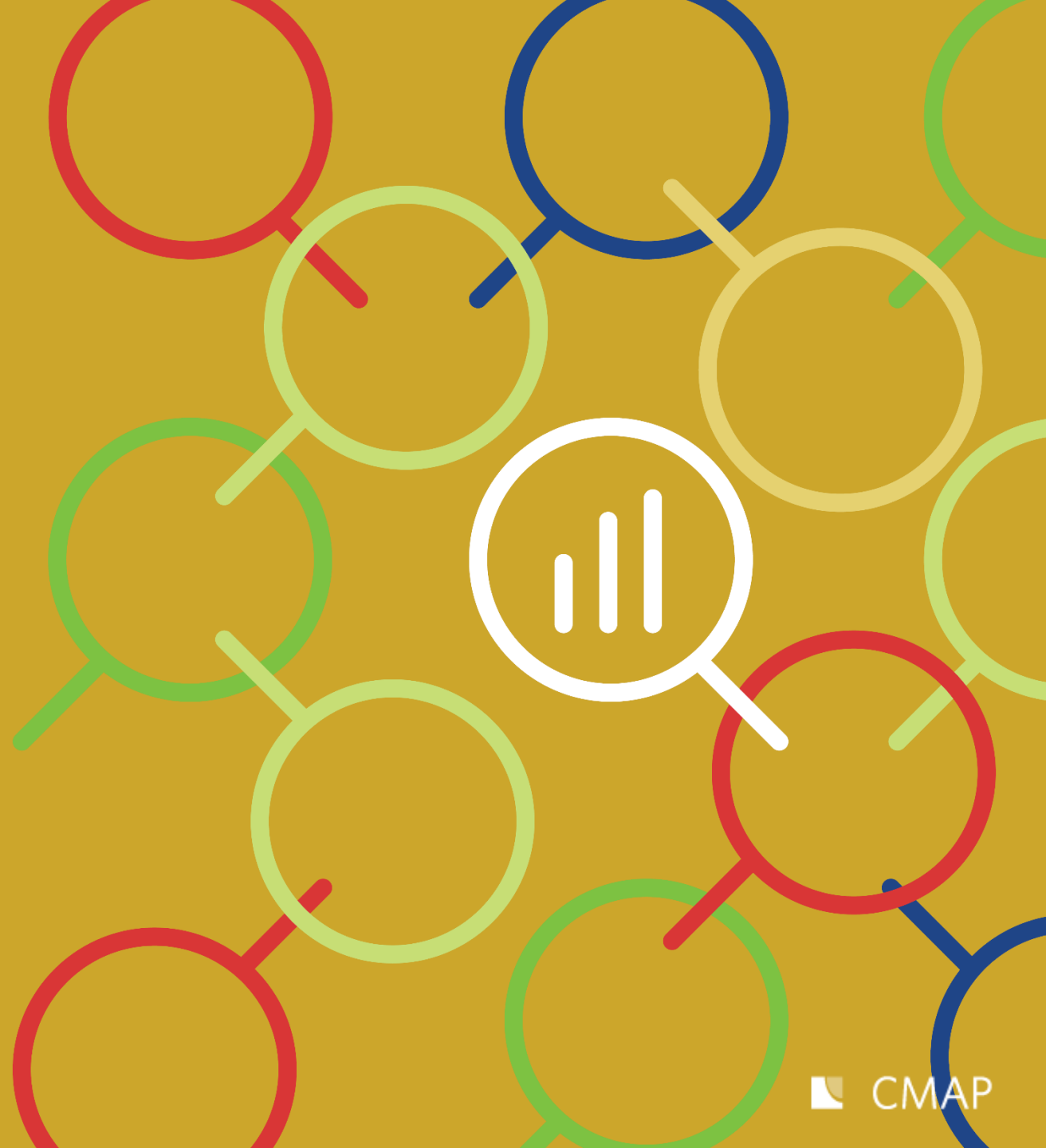


# Majority of emissions from Urban Roads

Percent Total Emissions by Year by Road Type for Spring 2020 Conformity Run  
Majority of VMT is from urban unrestricted roads, followed by urban restricted (bottom)

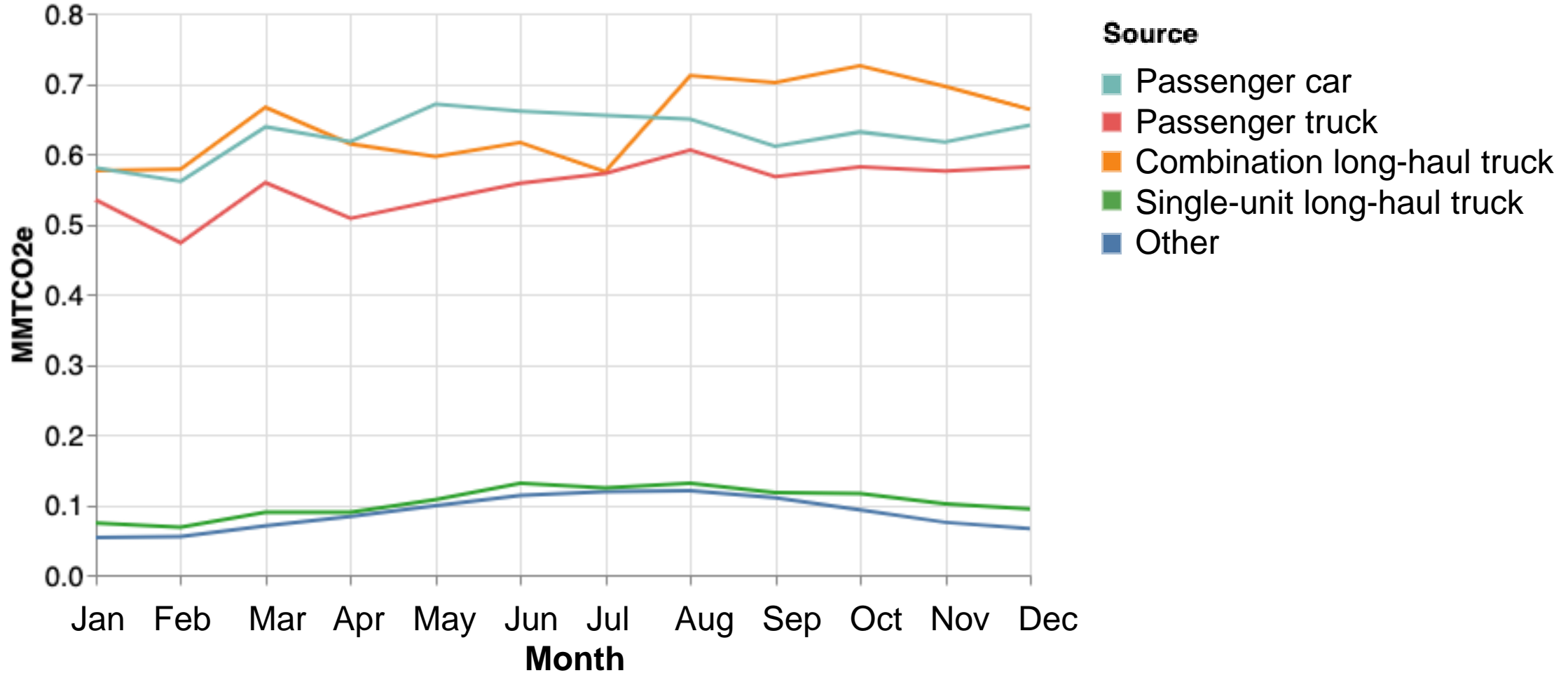


How do emissions  
by source vary at  
different **time**  
**scales**?



# Truck emissions peak August - November, Passenger Car emissions peak May - July

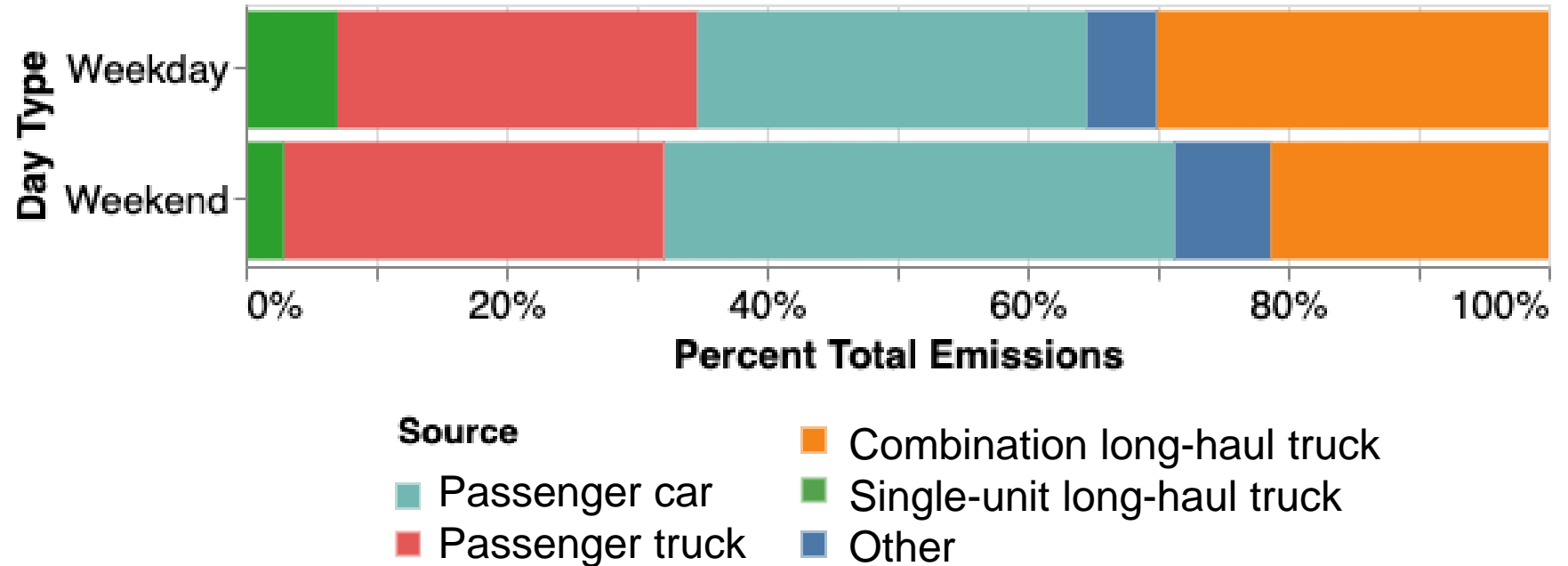
2050 Emissions by Month by Source Type for June 2020 Conformity Run



# Lower emissions on weekend, and increased portion of weekend emissions from passenger vehicles

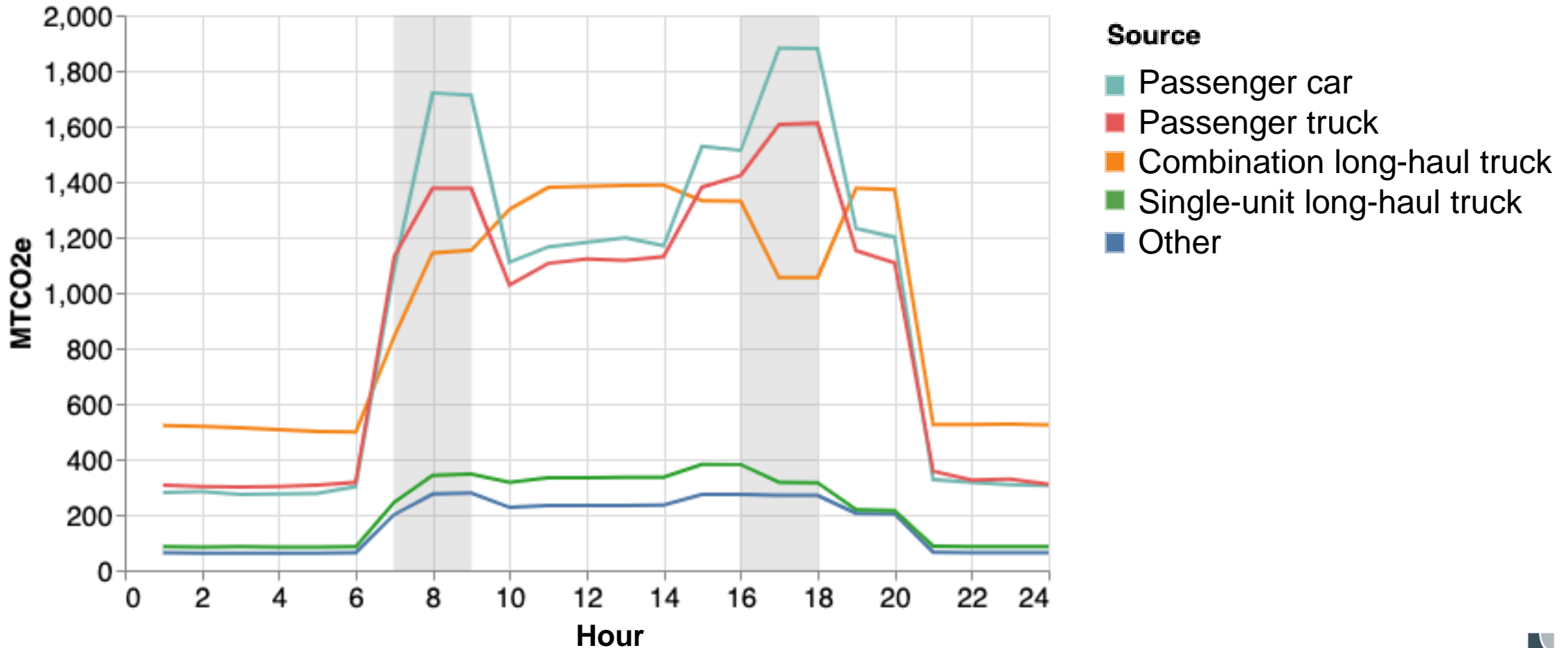
Percent Total 2050 July Emissions by Source Type and Day Type for June 2020 Conformity Run  
Weekend VMT 29% less than weekday VMT. Truck VMT down 62% on weekend, passenger VMT down 26%.

Weekend emissions  
**38.5%**  
less than  
weekday  
emissions



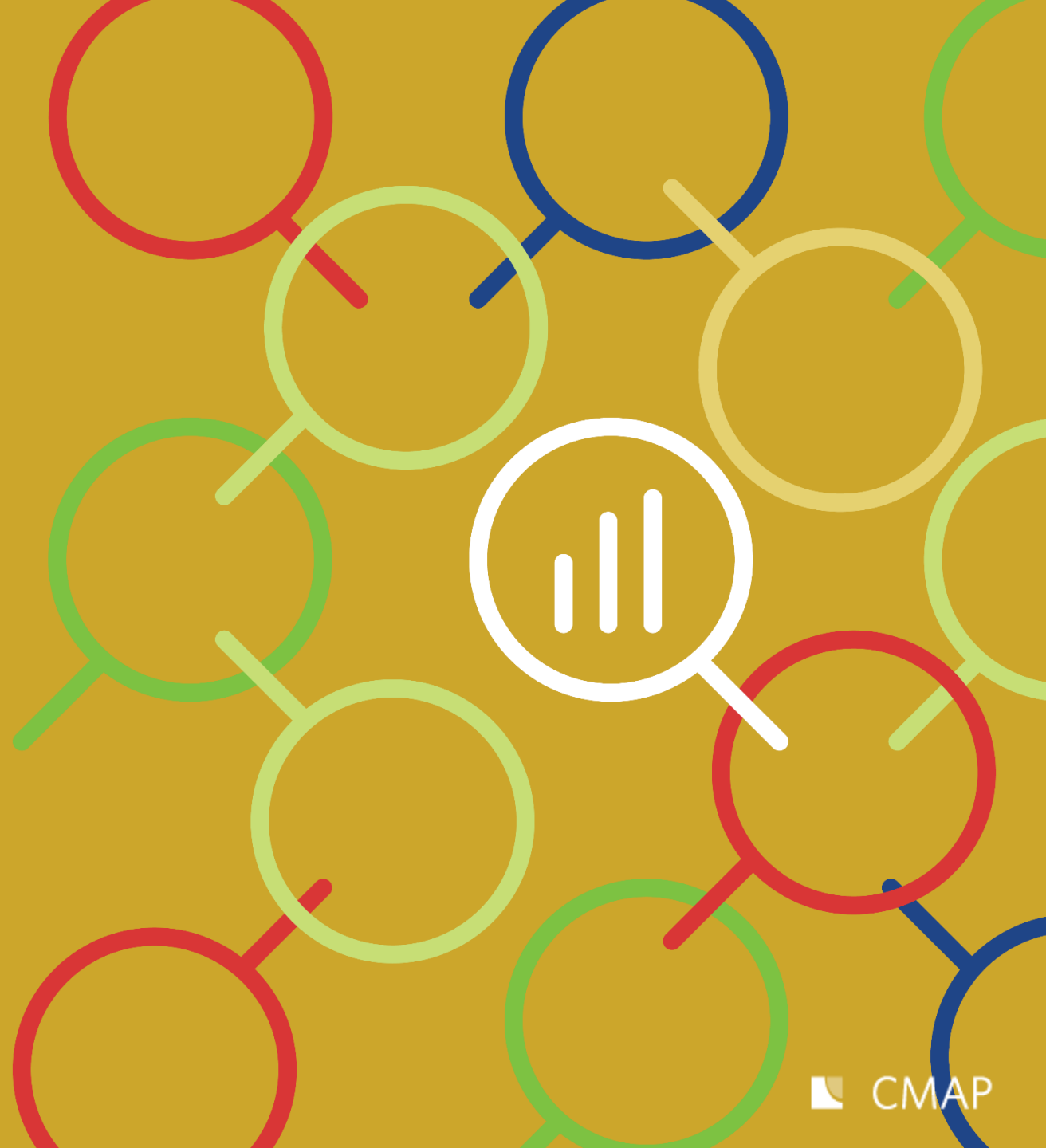
# Passenger vehicle emissions peak during AM and PM peak travel periods

Emissions by Source by Hour for June 2020 Conformity Run for July weekday in 2050



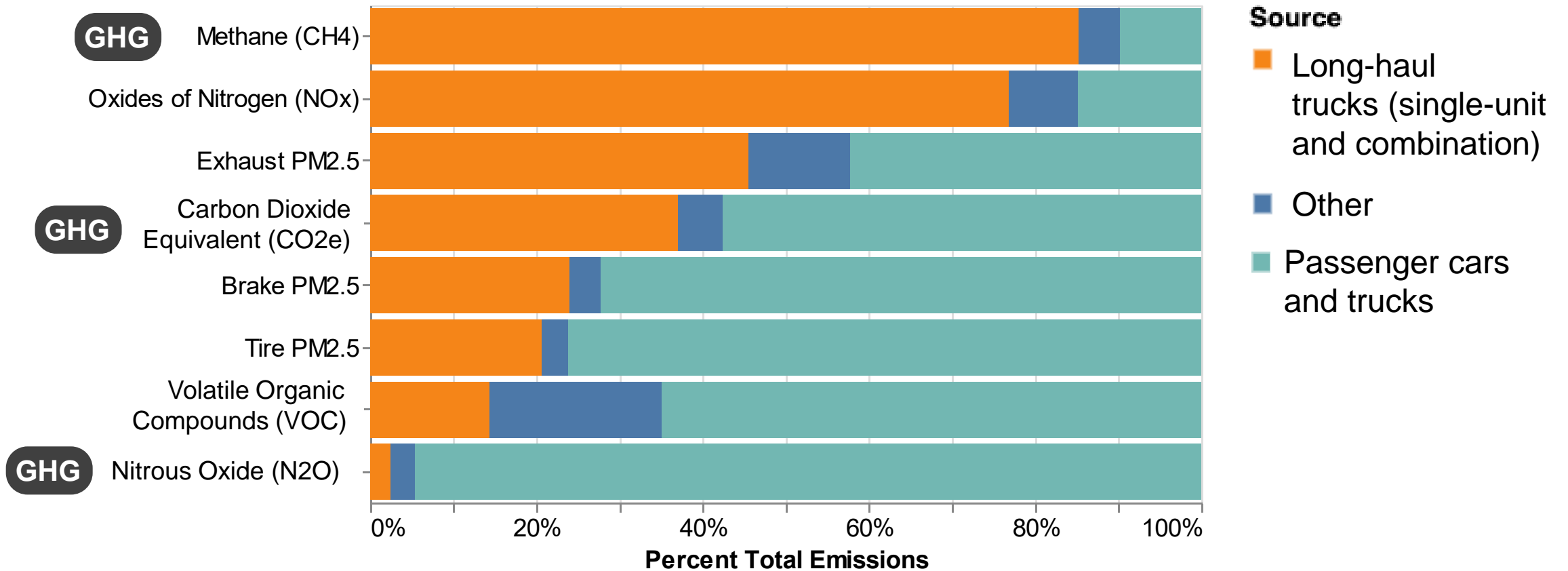


What about **other**  
**pollutants?**



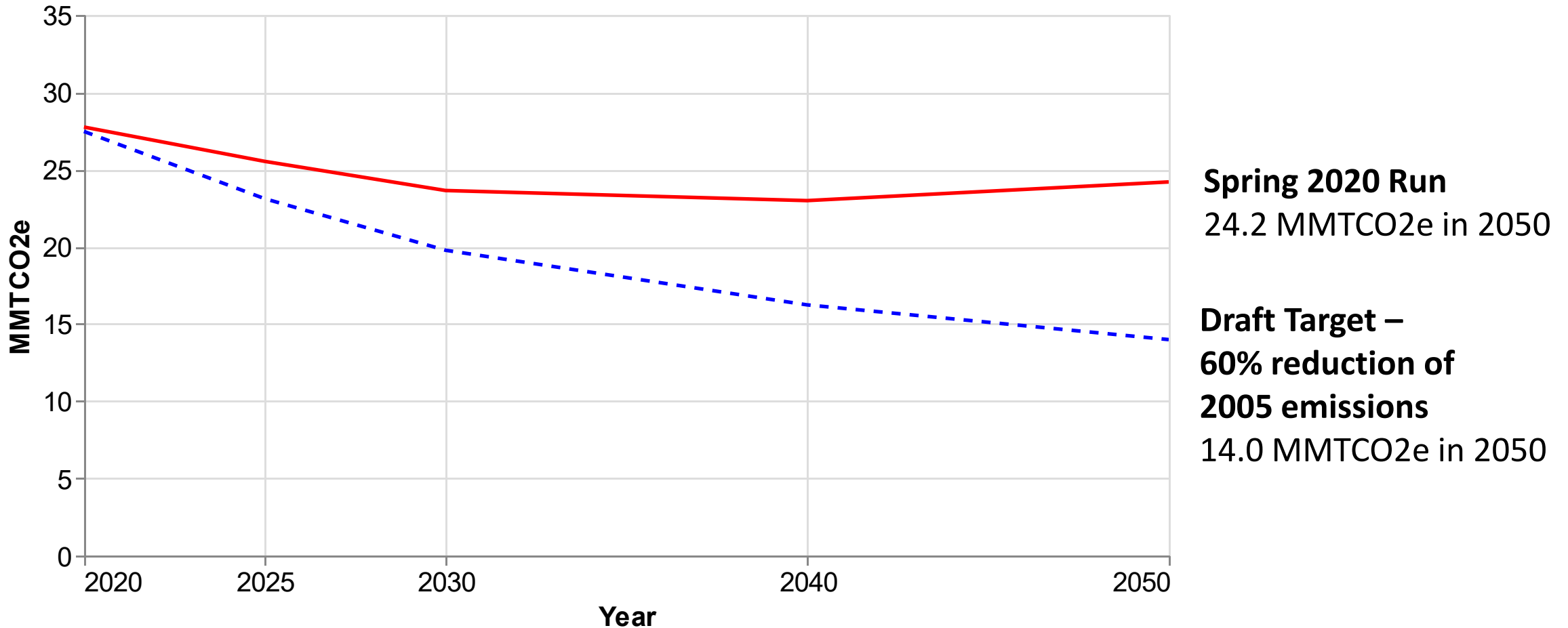
# Trucks major sources of methane, NOx, and exhaust PM2.5, while passenger vehicles top sources of brake and tire PM2.5, VOC, and N2O

2050 July Weekday Percent Total Emissions by Source for June 2020 Conformity Run



# Where are we trying to go?

Emissions by Year for Spring 2020 Conformity Run and Draft Reduction Target

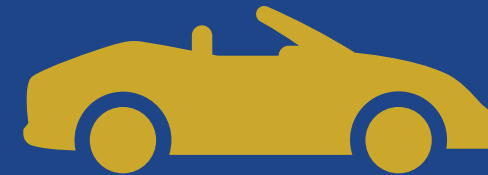


# Next Steps

Refine transportation-sector emissions target



Model mitigation strategies using this baseline



Transition to MOVES3



Look at emissions on different geographic scales



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