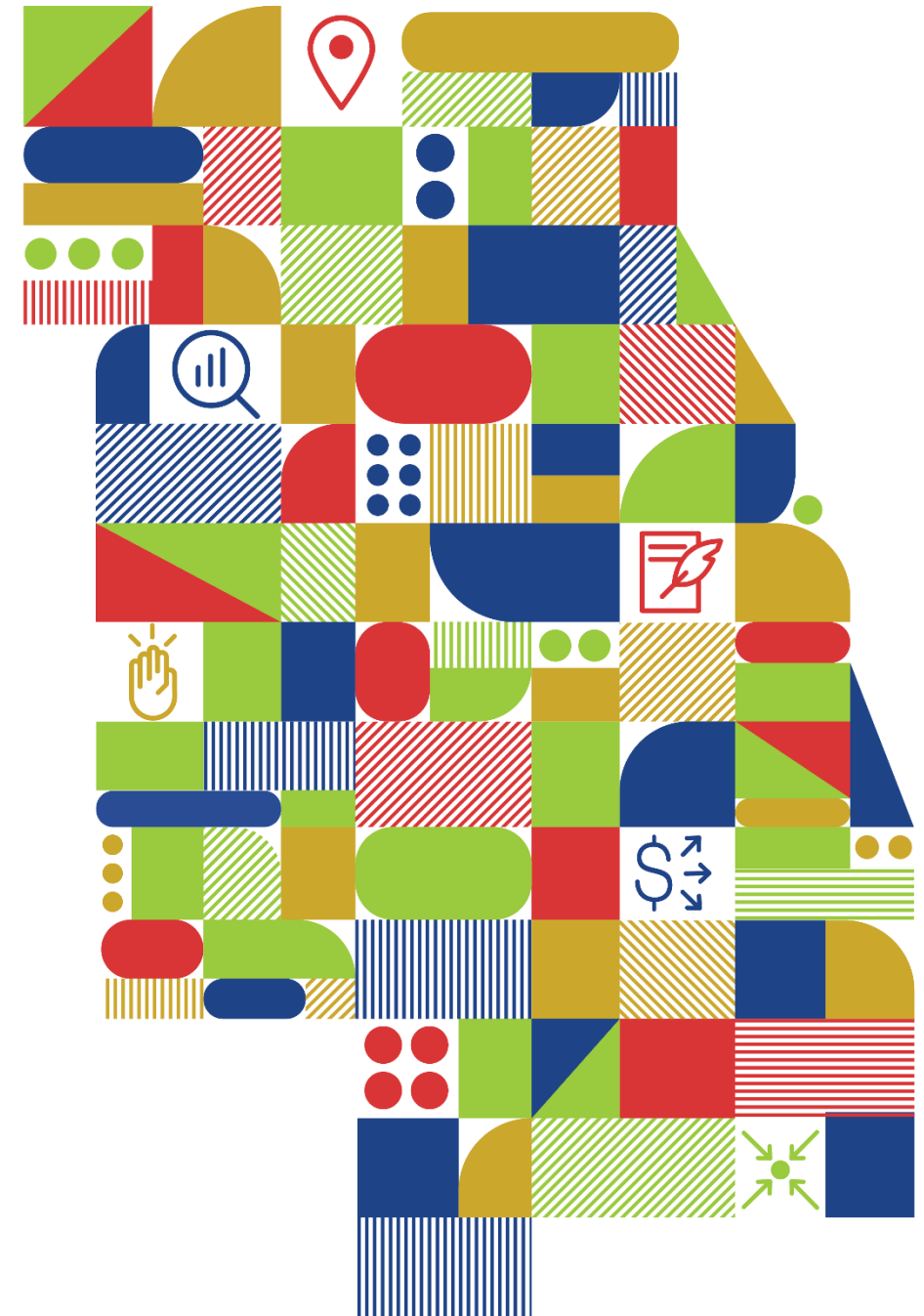




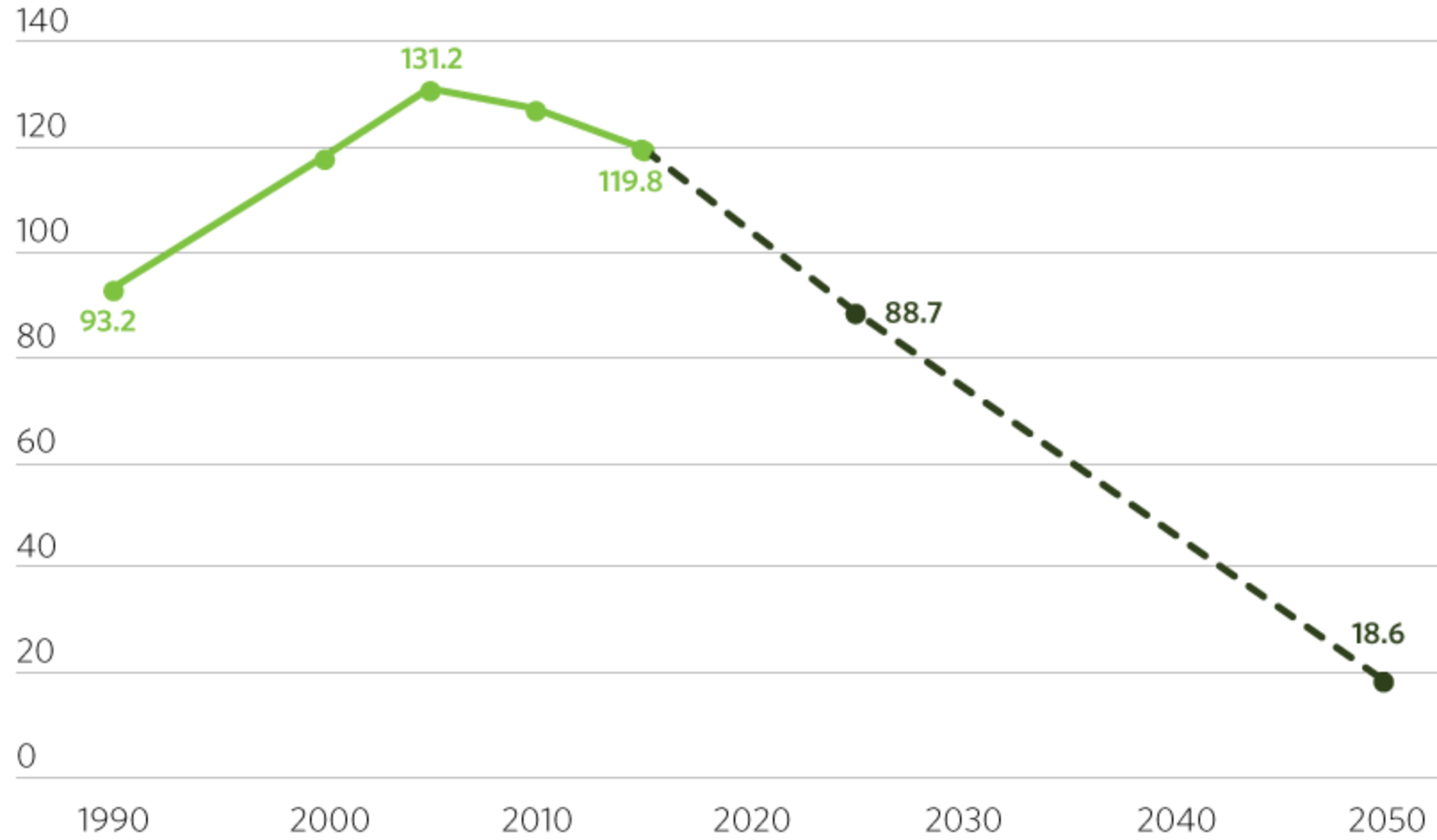
ON TO 2050 Implementation: Climate mitigation and adaptation

Freight committee
December 7, 2020



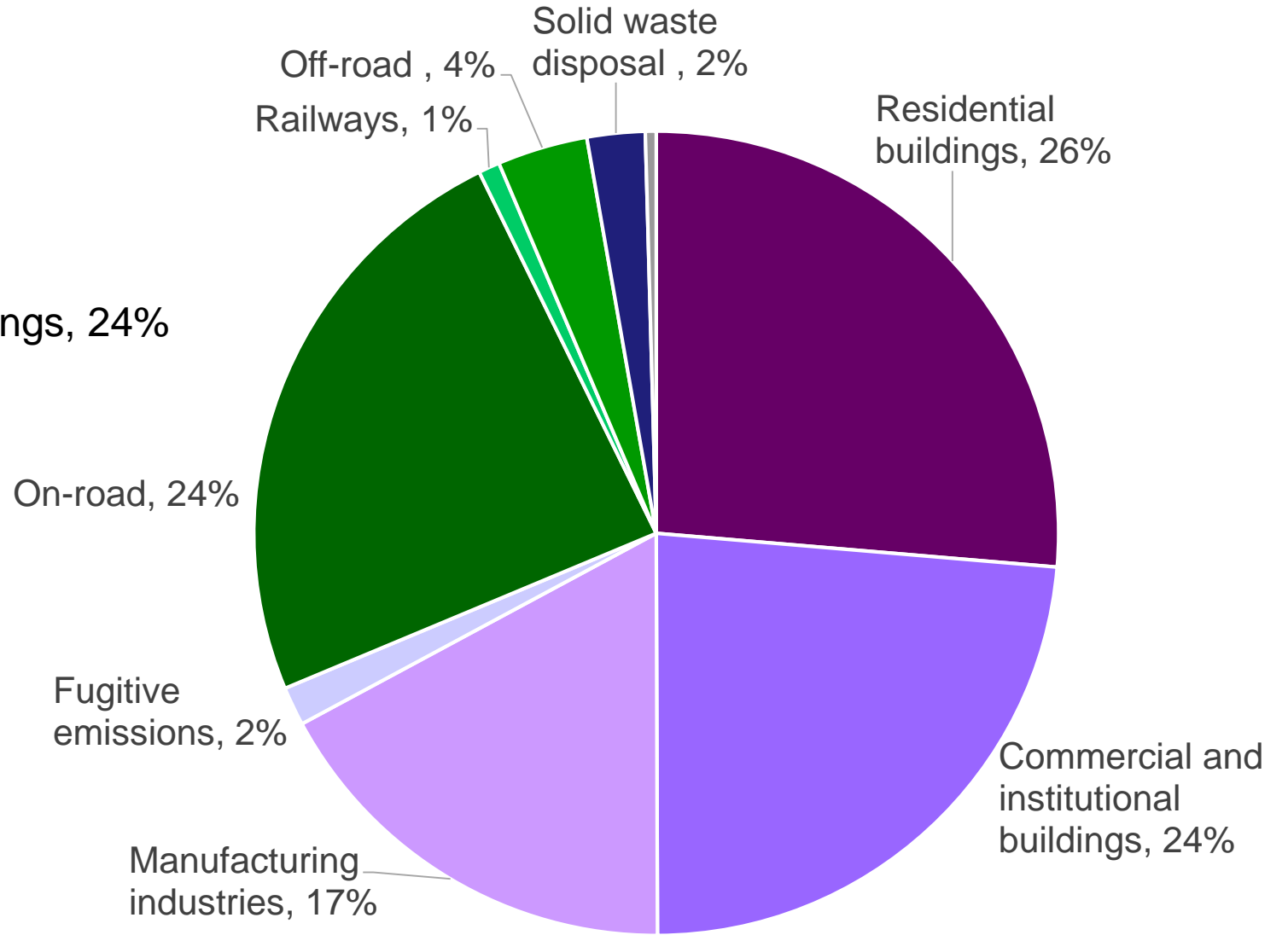
Greenhouse gas emissions for Chicago region, MMTCO₂e

- Actual
- Target



Greenhouse gas emissions by subsector for Chicago region, 2015

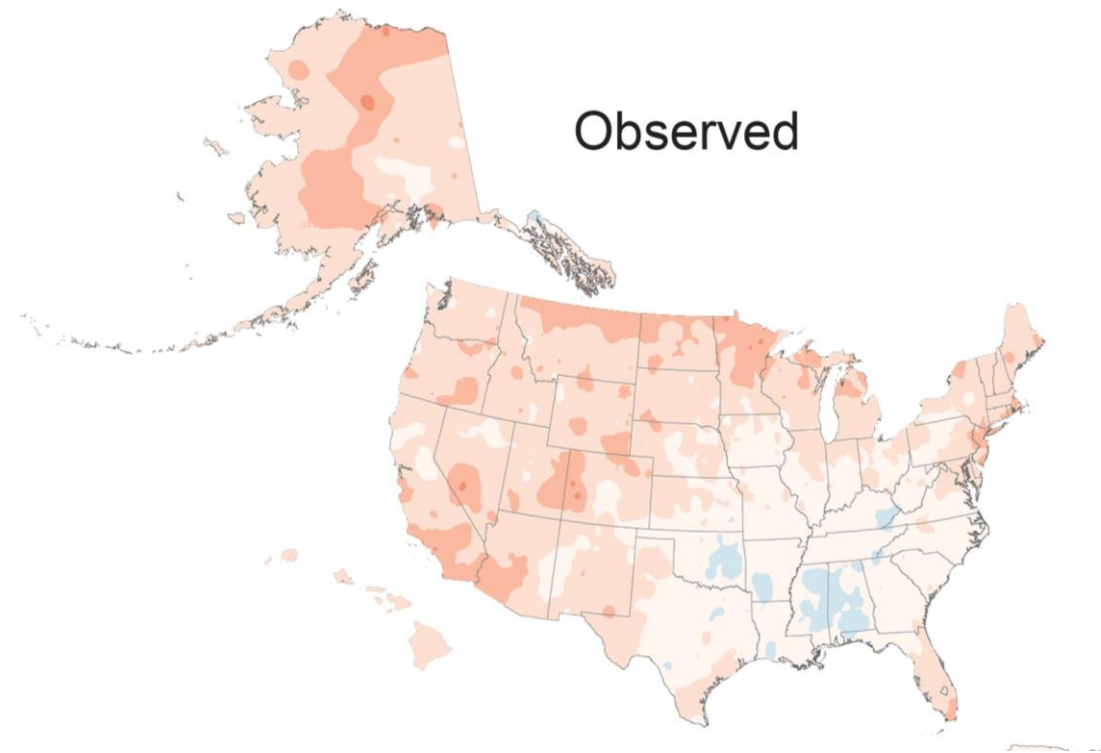
- Residential buildings, 26%
- Commercial and institutional buildings, 24%
- Manufacturing industries, 17%
- Fugitive emissions, 2%
- On-road, 24%
- Railways, 1%
- Off-road, 4%
- Disposal of solid waste, 2%
- Other, 0.43%*



Steady increases in temperature

OBSERVED

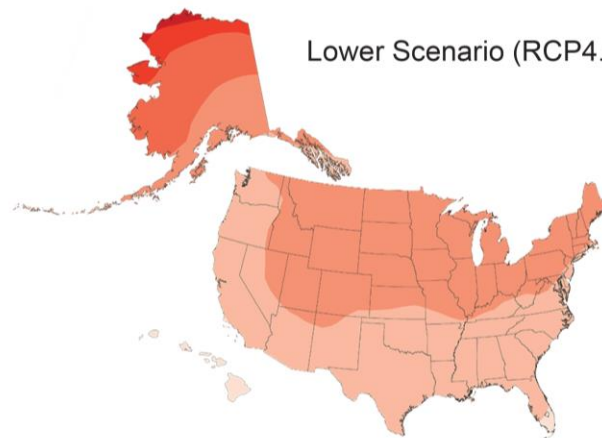
Observed



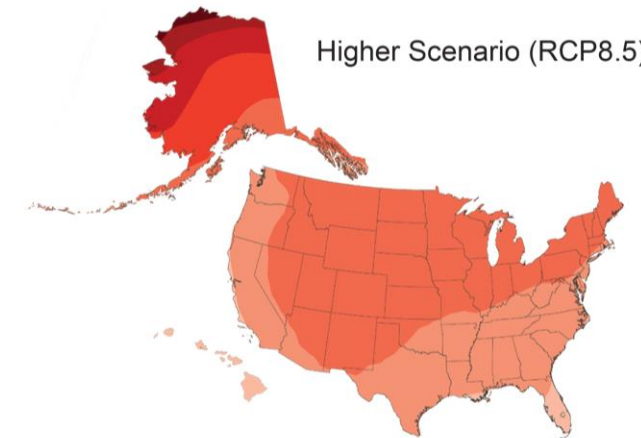
PROJECTED

Mid-21st Century

Lower Scenario (RCP4.5)

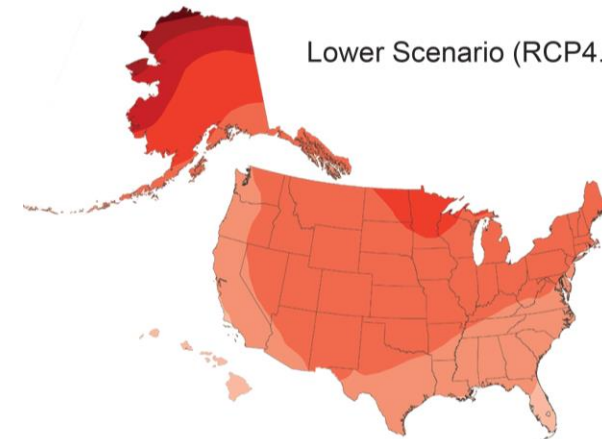


Higher Scenario (RCP8.5)

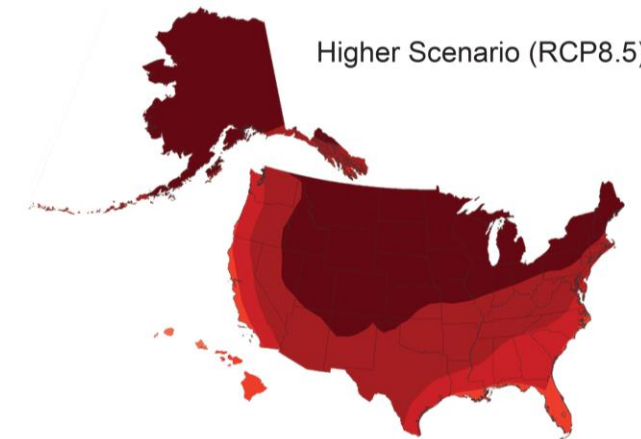


Late 21st Century

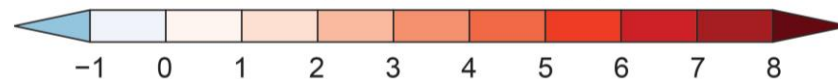
Lower Scenario (RCP4.5)



Higher Scenario (RCP8.5)



Change in Temperature (°F)



Steady annual increases in precipitation

PROJECTED

Late 21st Century, Higher Scenario (RCP8.5)

Winter

Spring

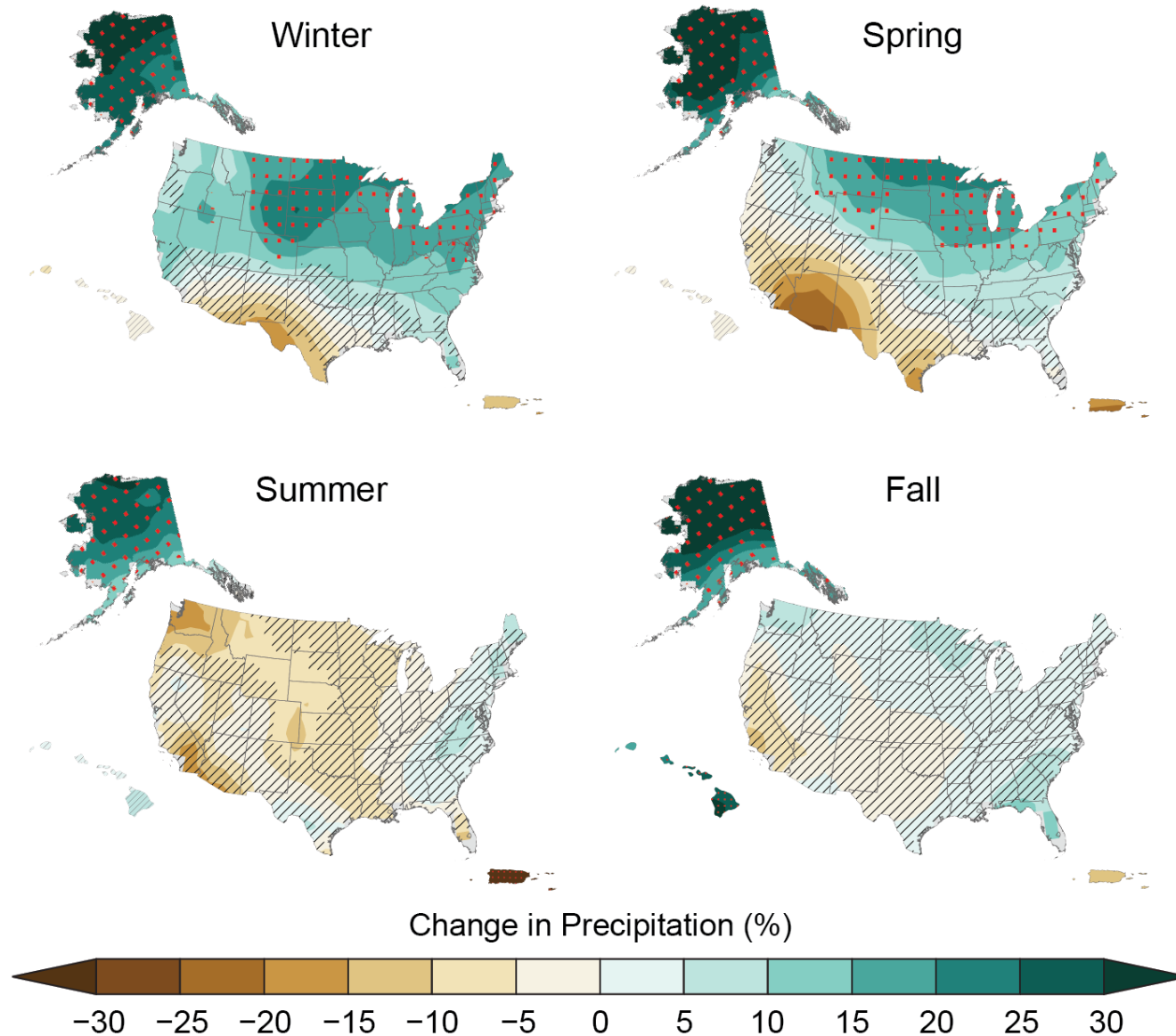
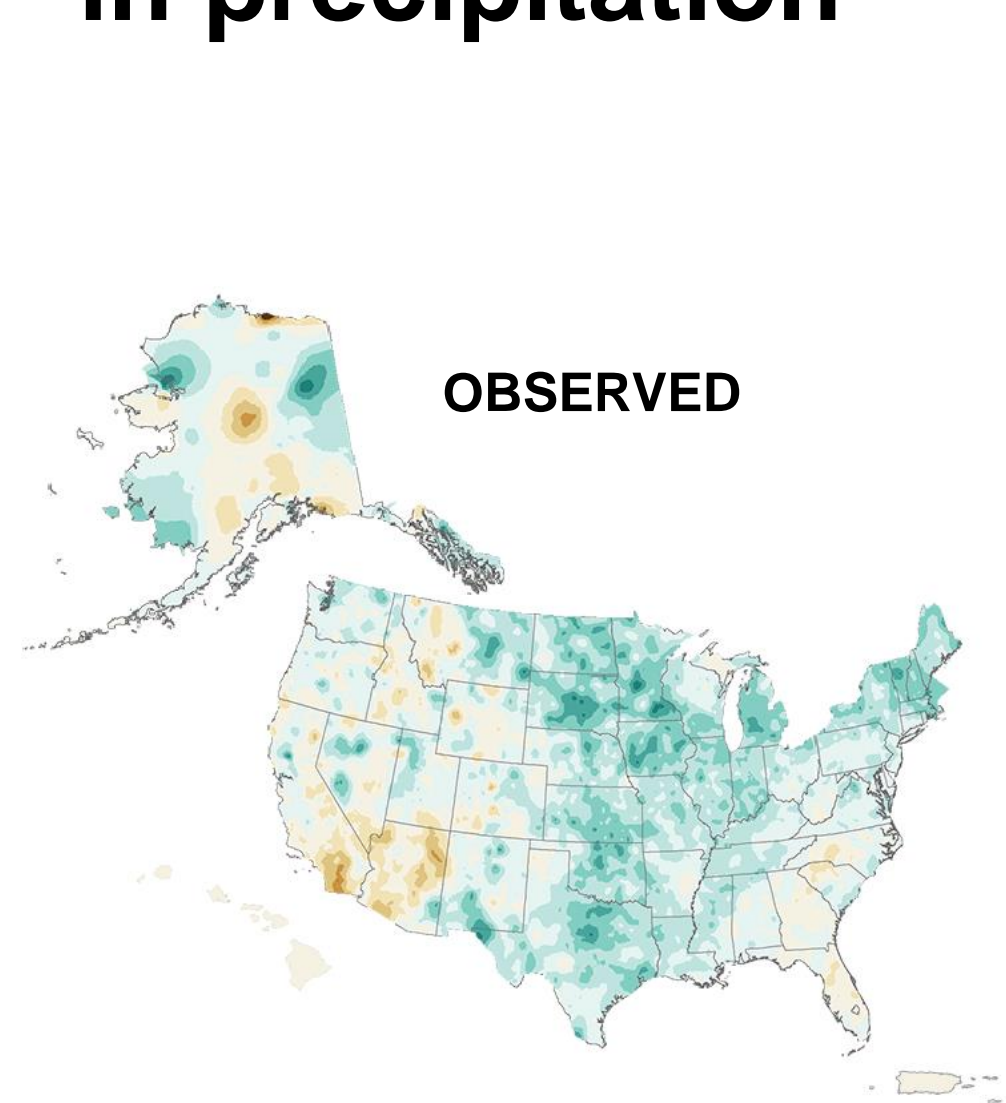
Summer

Fall

OBSERVED

Change in Precipitation (%)

-30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30



CMAP's climate resources

CMAP's climate resources

Policy and Guidance

- Climate Adaptation Guidebook
- ON TO 2050 Climate Resilience, Stormwater, and Energy Strategy Papers
- Partnered with APA to develop a Climate Science Guidebook
- Guide to Flood Susceptibility and Stormwater Planning
- Stormwater Utility Guide

Local Technical Assistance

- 4 vulnerability assessment pilots, 12 stormwater “plans”
- Park Forest, DuPage County Sustainability Plan/Guide
- Will Co. Brownfield Prioritization for Solar Energy Development

CMAP's climate resources

Transportation Programming

- Regionally Significant Project (RSP) evaluation
- Congestion Mitigation and Air Quality Program (CMAAQ)
- Transportation Alternatives Program (TAP-L)
- STP Shared Fund

CMAP's climate resources

Data

- Regional greenhouse gas inventories (2010, 2015)
- Green Infrastructure Vision with estimates of carbon sequestration ecosystem services (GIV 2.3)
- Regional Flood Susceptibility Index (2017)
- Regional water demand forecasts (2010, 2018)

CMAP's current work on climate

FY21 Climate Work Plan

- Climate multi-year implementation planning
- Transportation mitigation strategies
- GHG reporting and performance monitoring
- Climate mitigation and adaptation technical assistance
- Climate data inventory and refinement

FY21 Climate Work Plan

- Central Council of Mayors Transportation Vulnerability and Resilience Plan (LTA)
- CMAP Talks: Regional Stormwater Resilience
- Assist MMC / Global Covenant of Mayors in a Chicago Region Municipal Climate Action Plan
- Heat Susceptibility Index

Climate Multi-year Implementation Planning

Project Purpose

Develop a workplan for the next 3 to 5 years that maps out a strategy for implementing climate-related ON TO 2050 recommendations.

- Understand the agency's role
- Identify specific, strategic projects
- Integrate equity considerations

Scope



Explore priority ON TO 2050 strategies

- Transform transportation systems to reduce emissions
- Incorporate climate mitigation and adaptation into planning and development
- Strengthen gray and green infrastructure to withstand climate change
- Explore a regional climate resilience platform to coordinate initiatives and provide data and resources
- Enhance economic innovation
- Address environmental challenges that disproportionately affect specific populations and disinvested areas

Discussion

1. What areas of work present the **best** opportunities for CMAP to advance change?
2. Within the **freight** umbrella, are there specific strategies CMAP should focus on?
3. How can CMAP assist or "jumpstart" implementation by other partners?

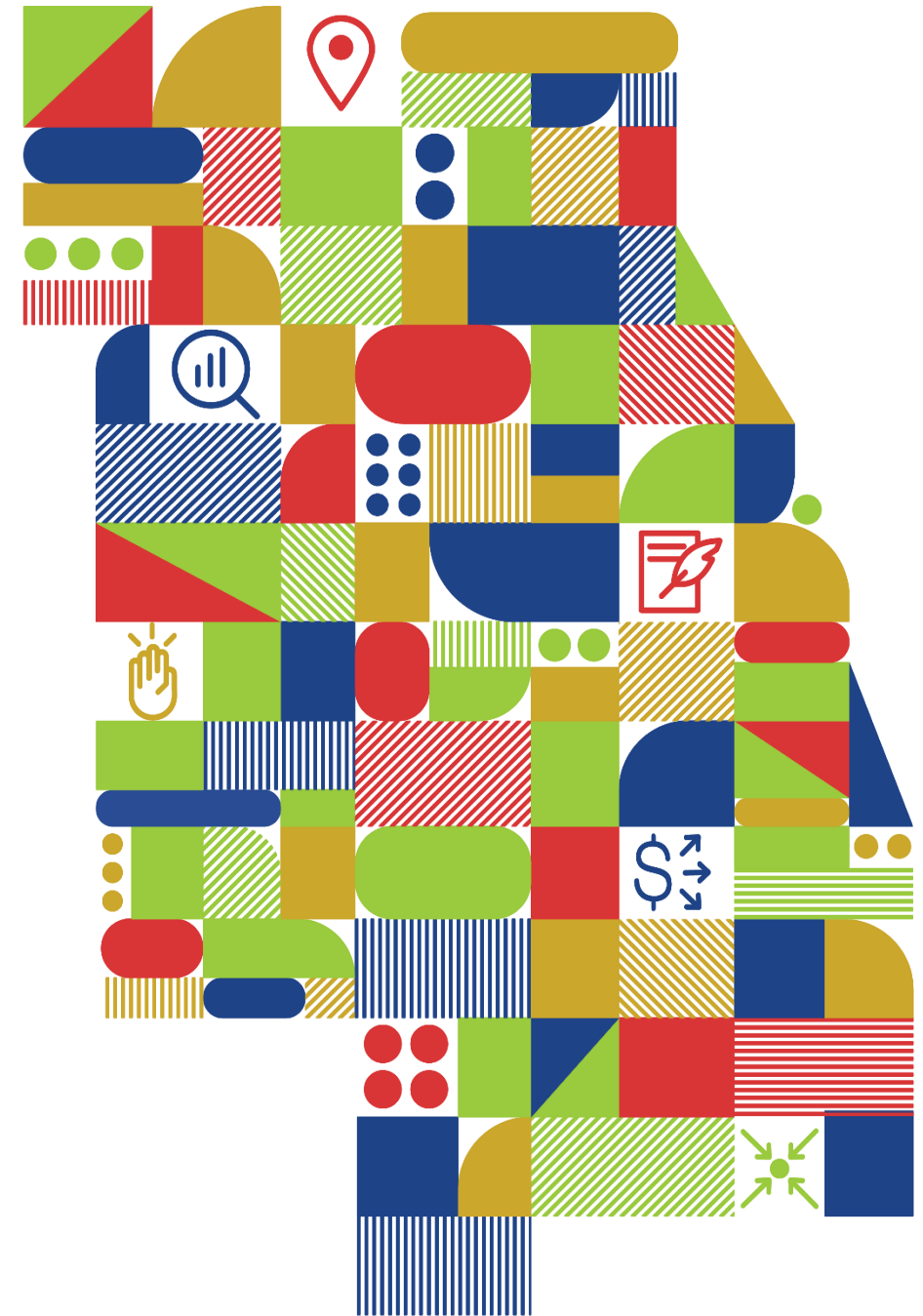


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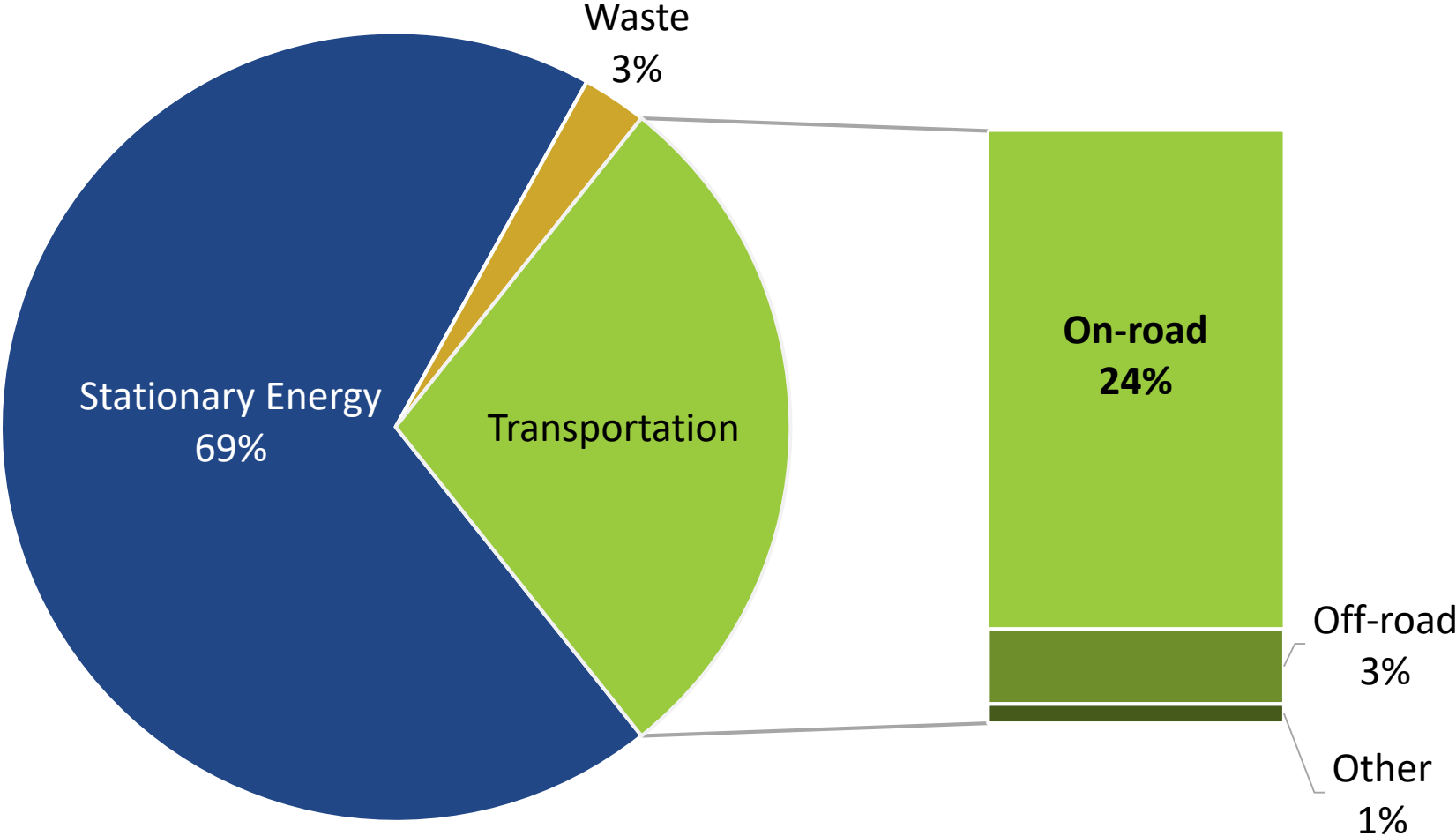
On-road Greenhouse Gas Emissions

December 7th, 2020



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

2015 Greenhouse Gas Inventory. Total Emissions = 119.13 MMTCO₂e.



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

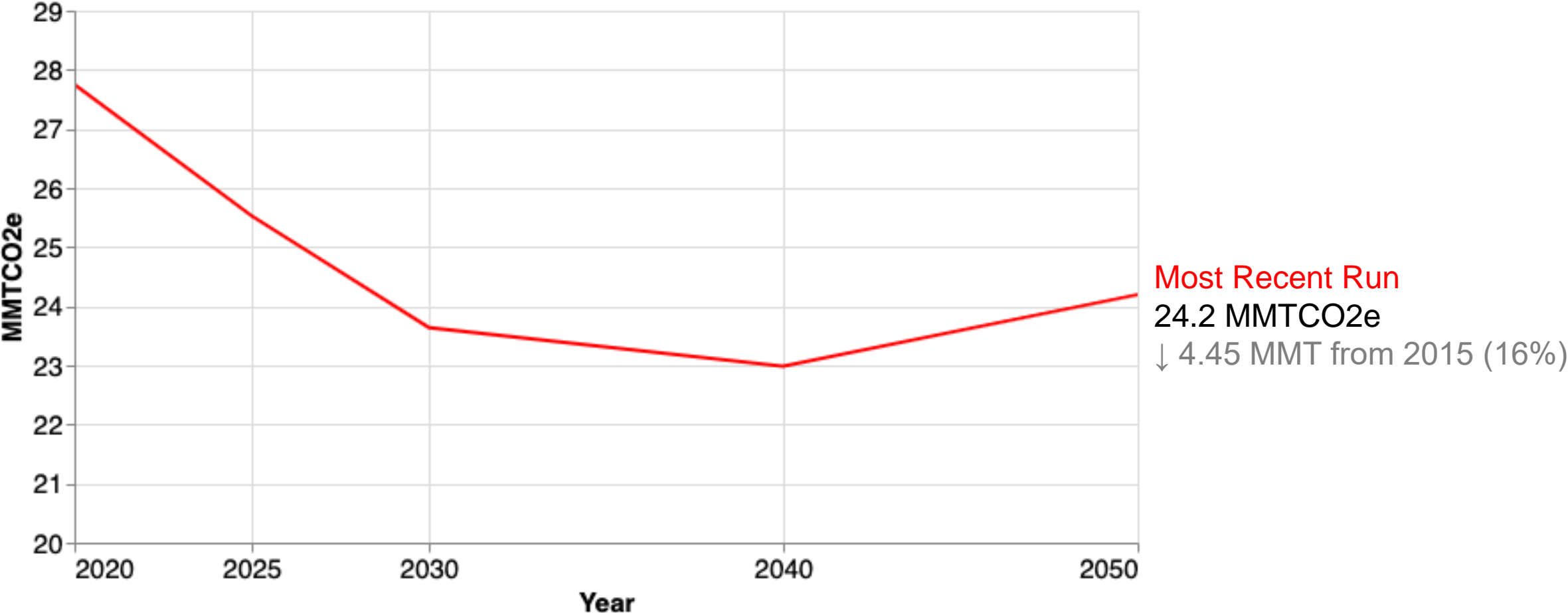
Road Type Distribution

Ramp Fraction



Greenhouse gas emissions decrease 16% by 2050

Emissions by Year for Spring 2020 Conformity Run



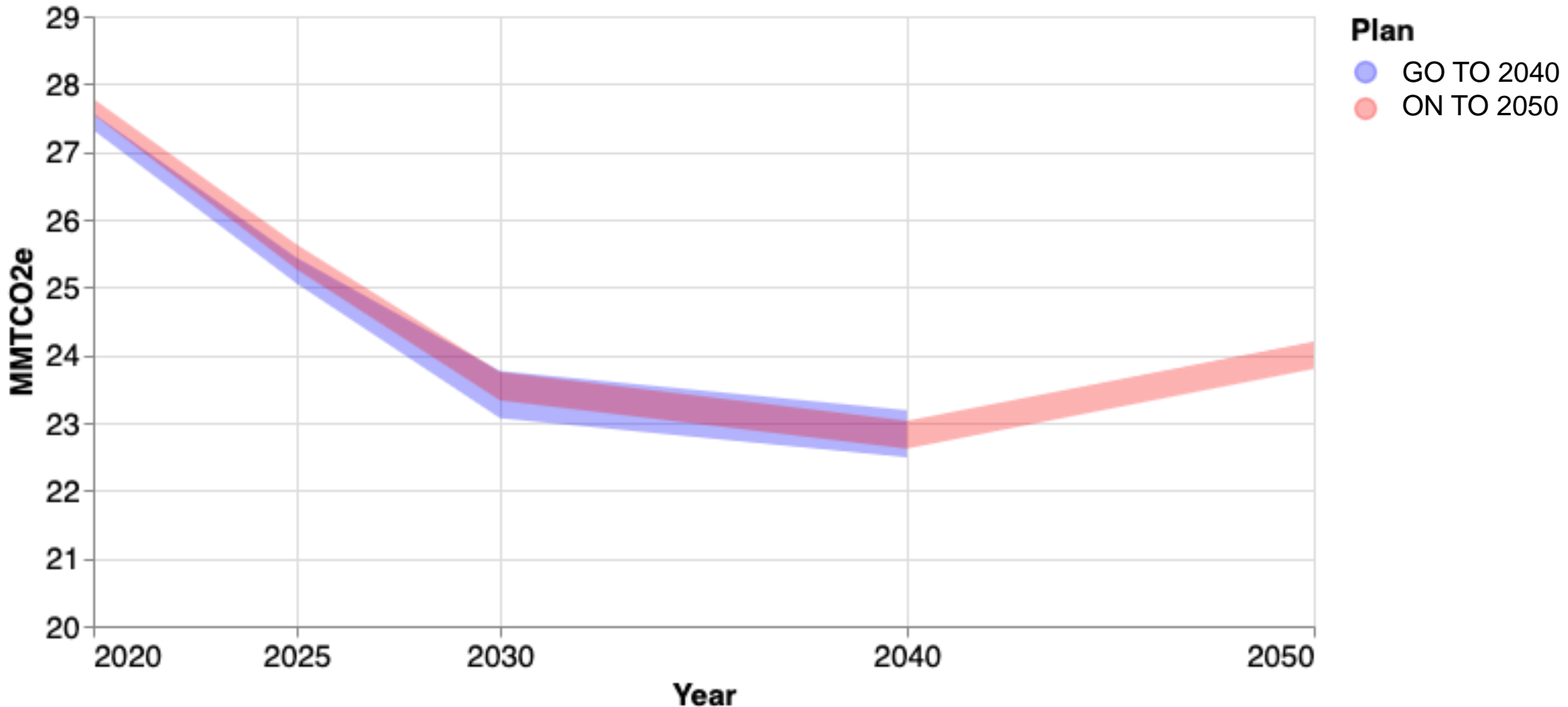
How do results vary
across **conformity**
runs?

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

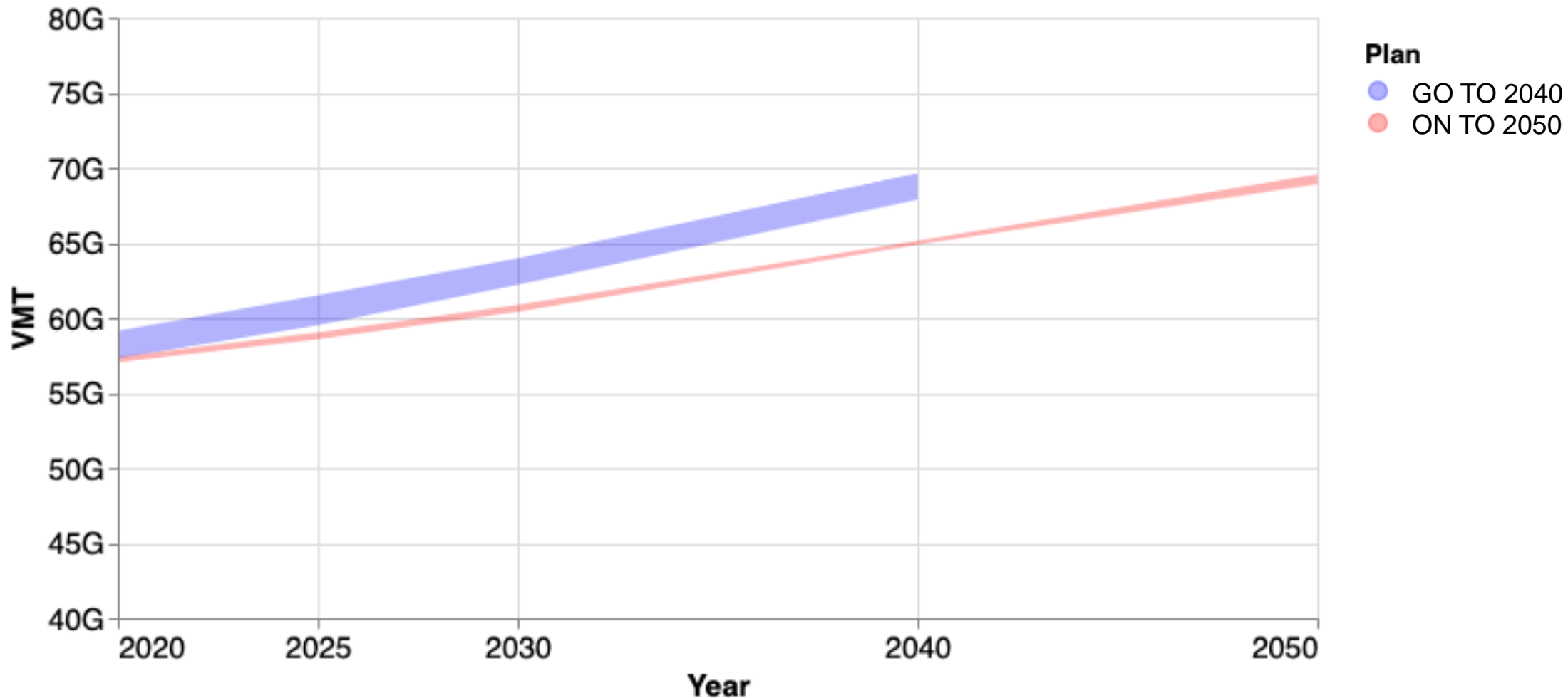
Results for each Plan are grouped together, and band shows the standard deviation extending from the mean for each year.



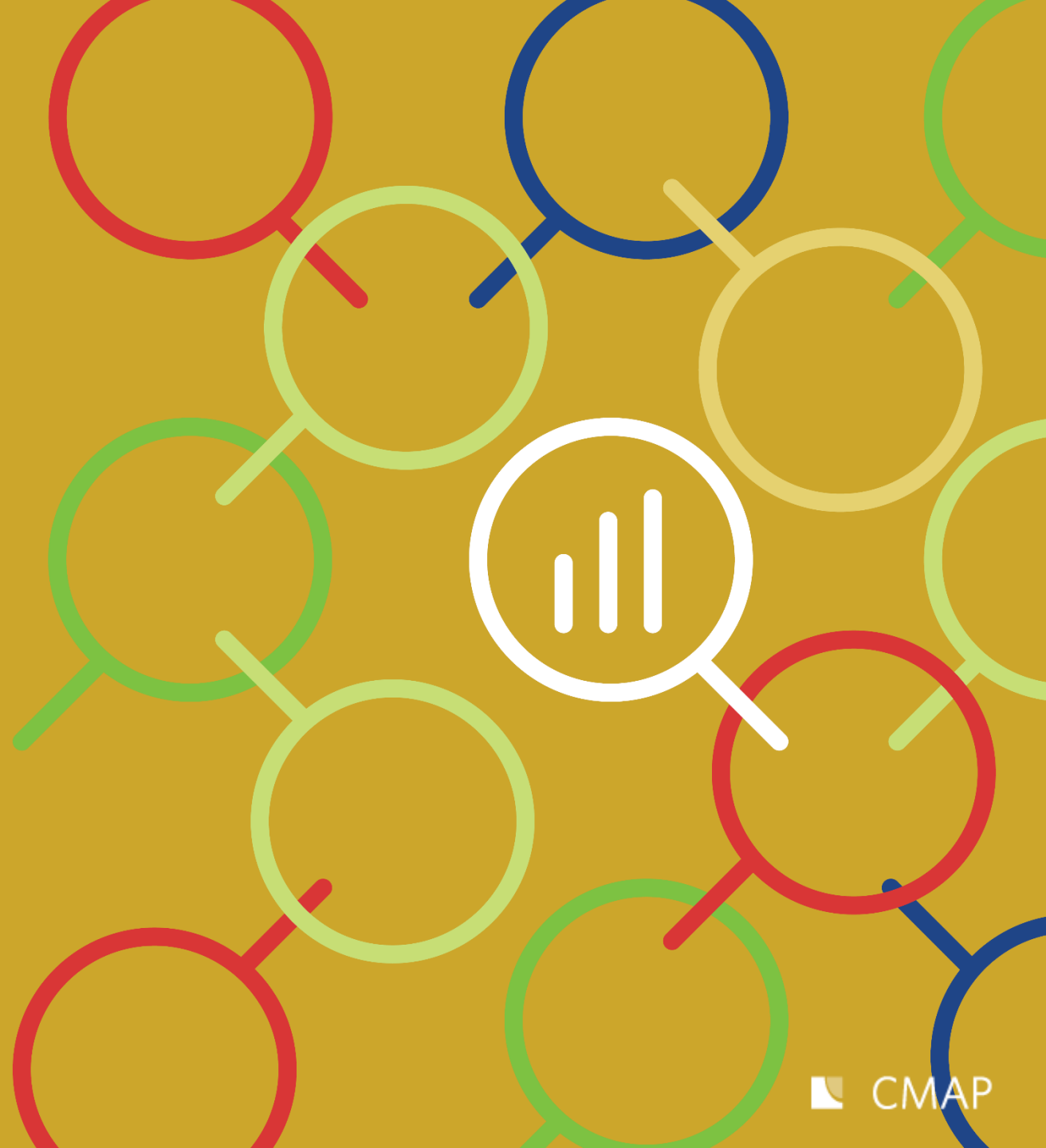
Total VMT is higher for GO TO 2040 runs

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

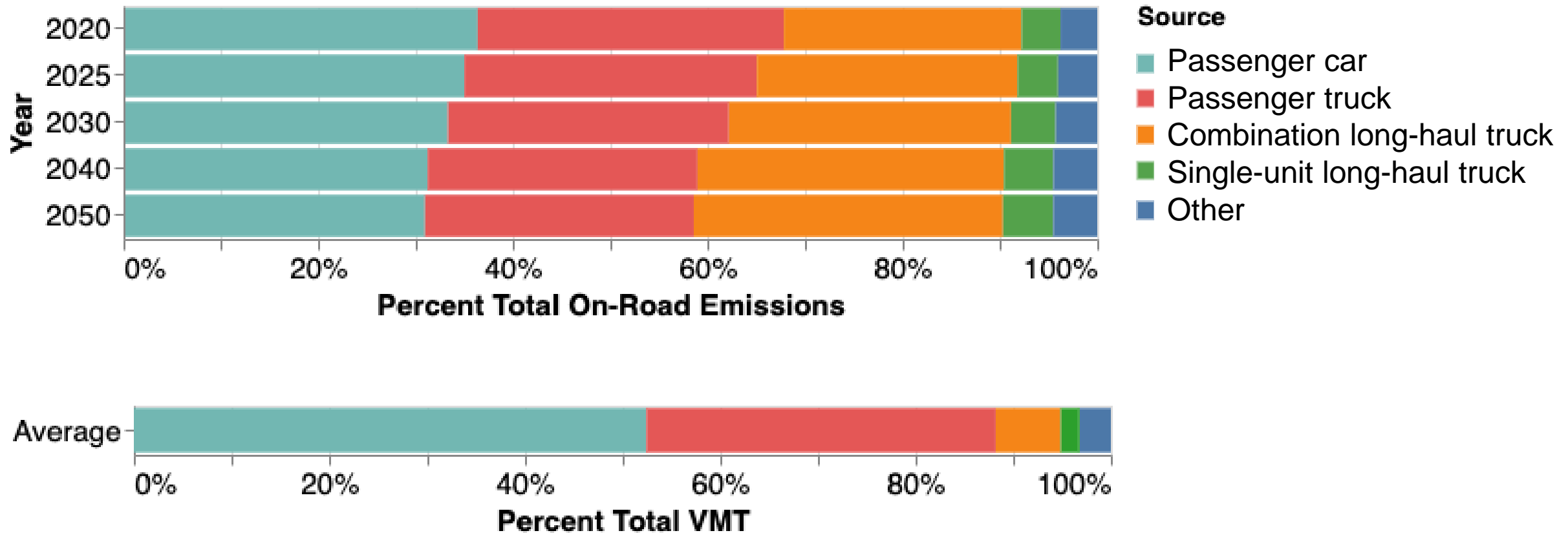
Other

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

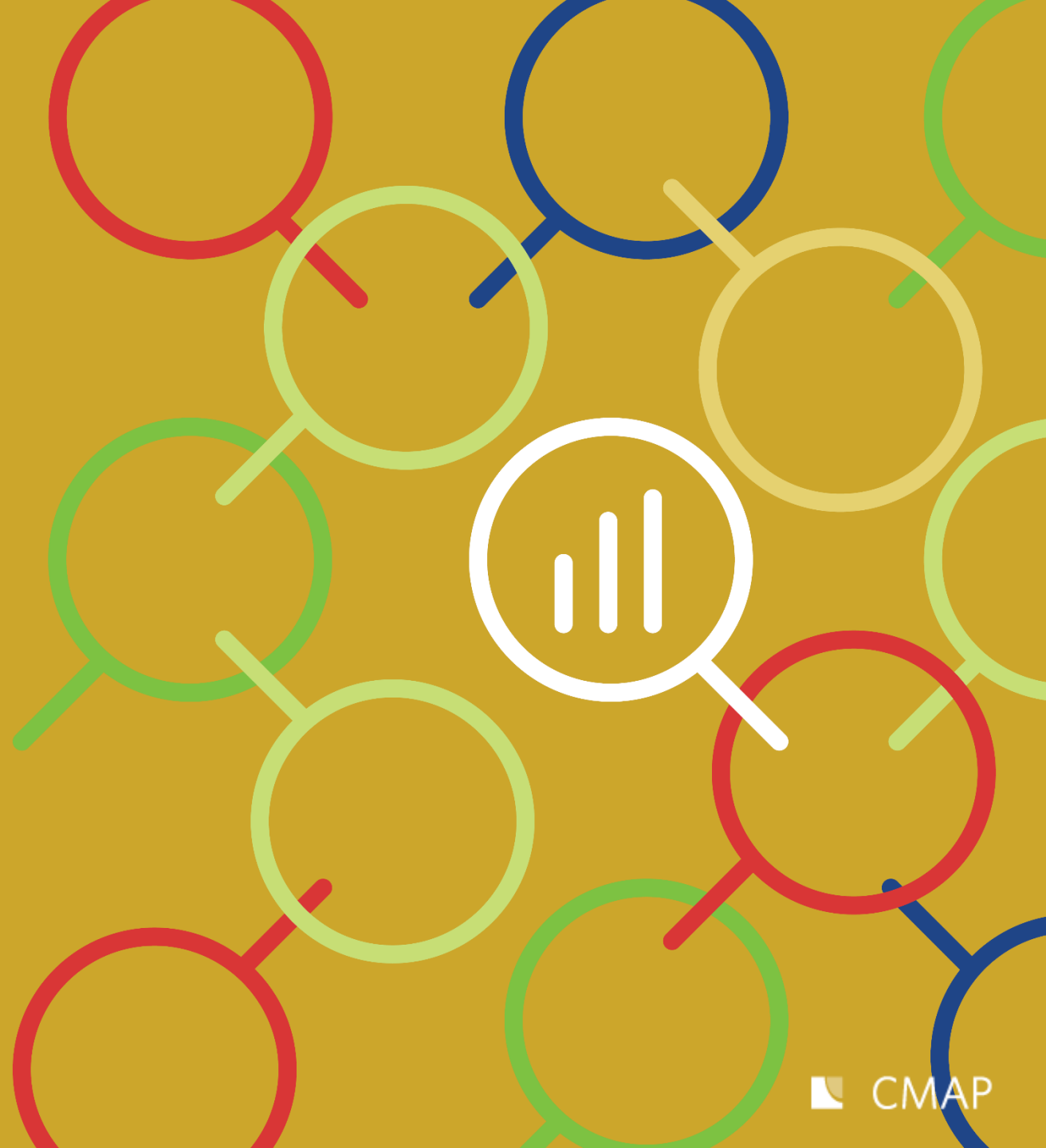
Majority of emissions from Passenger Cars, Passenger Trucks, and Combination Long-haul Trucks

Percent Total Emissions by Year by Source Type for Spring 2020 Conformity Run

Majority of VMT is from Passenger Cars and Trucks (bottom)

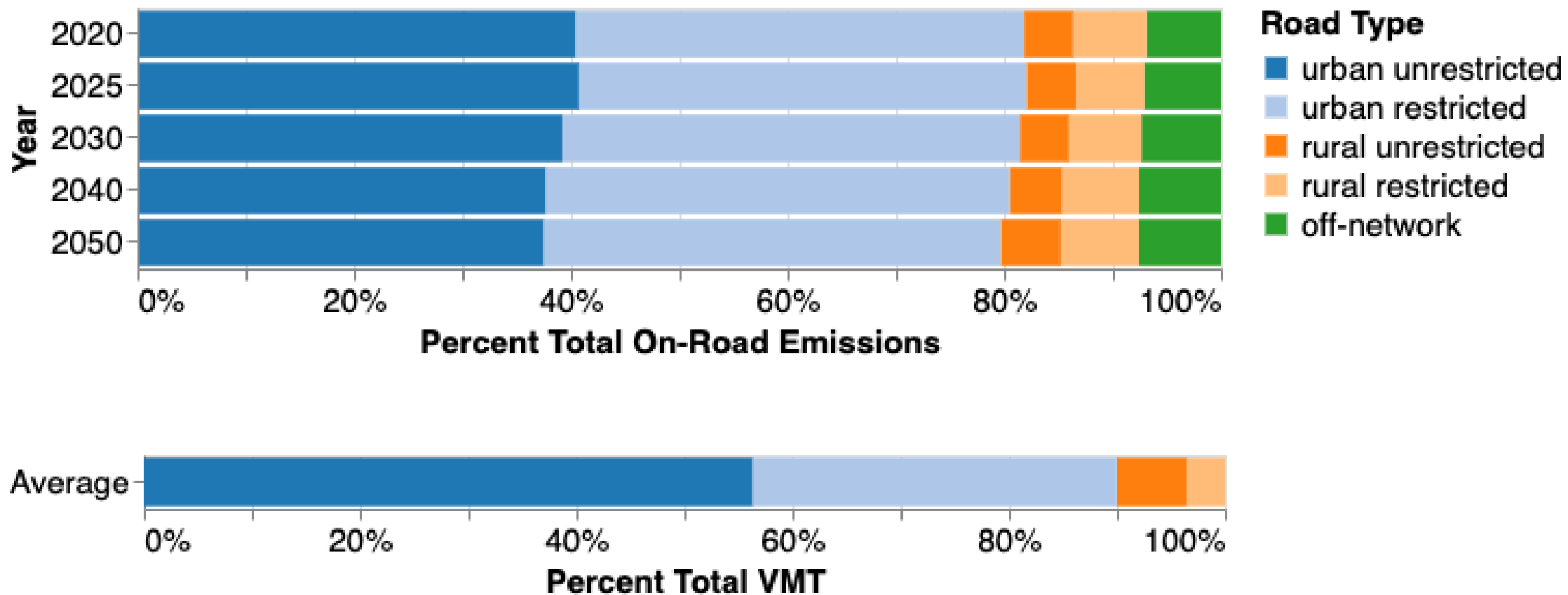


How are emissions spread across different **facility types**?

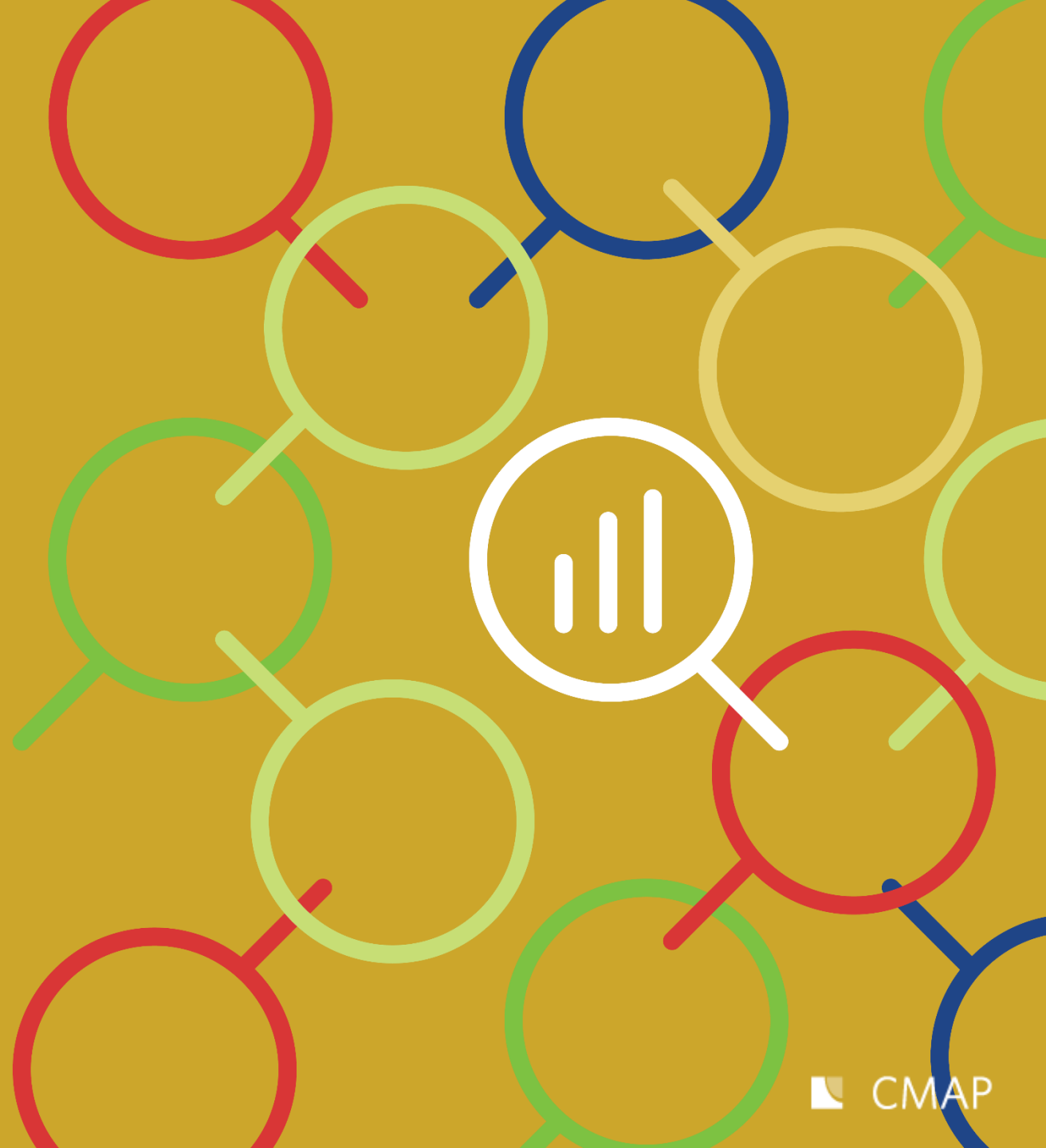


Majority of emissions from Urban Roads

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)

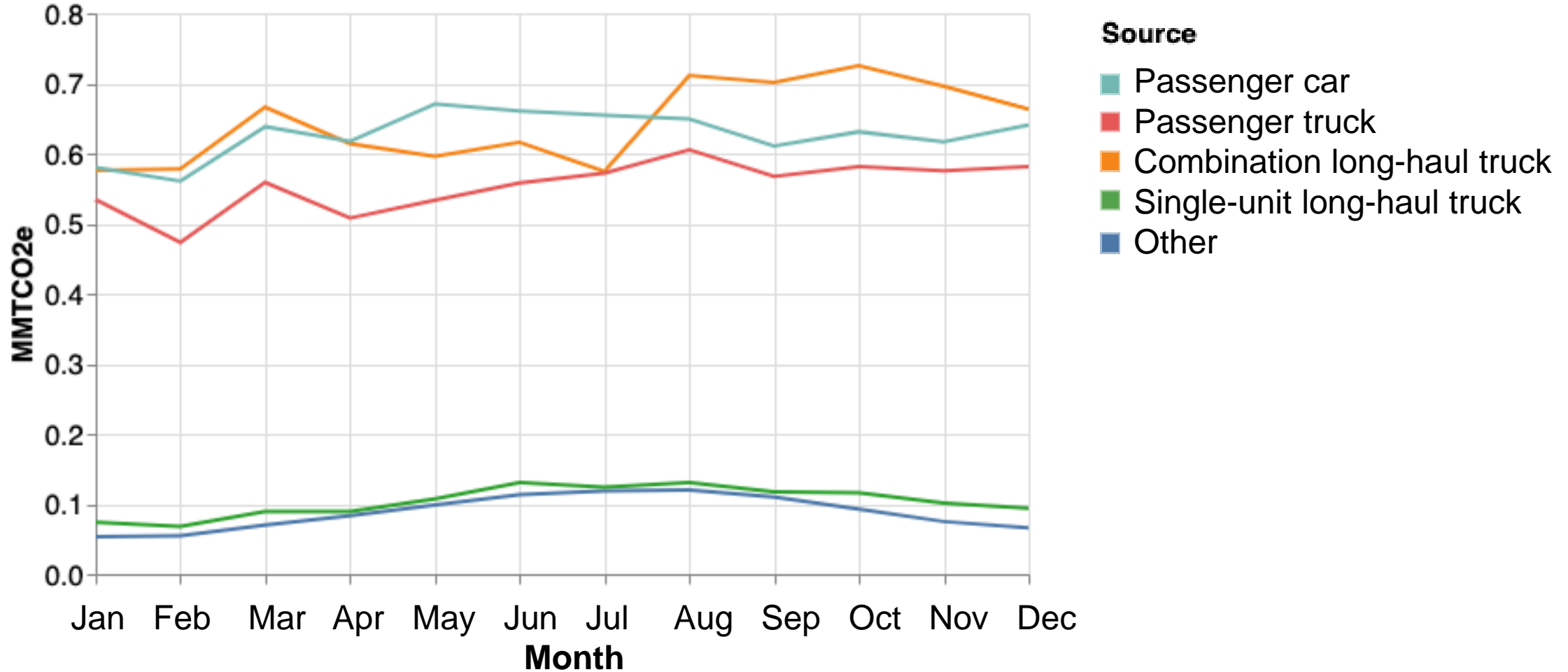


How do emissions
by source vary at
different **time**
scales?



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

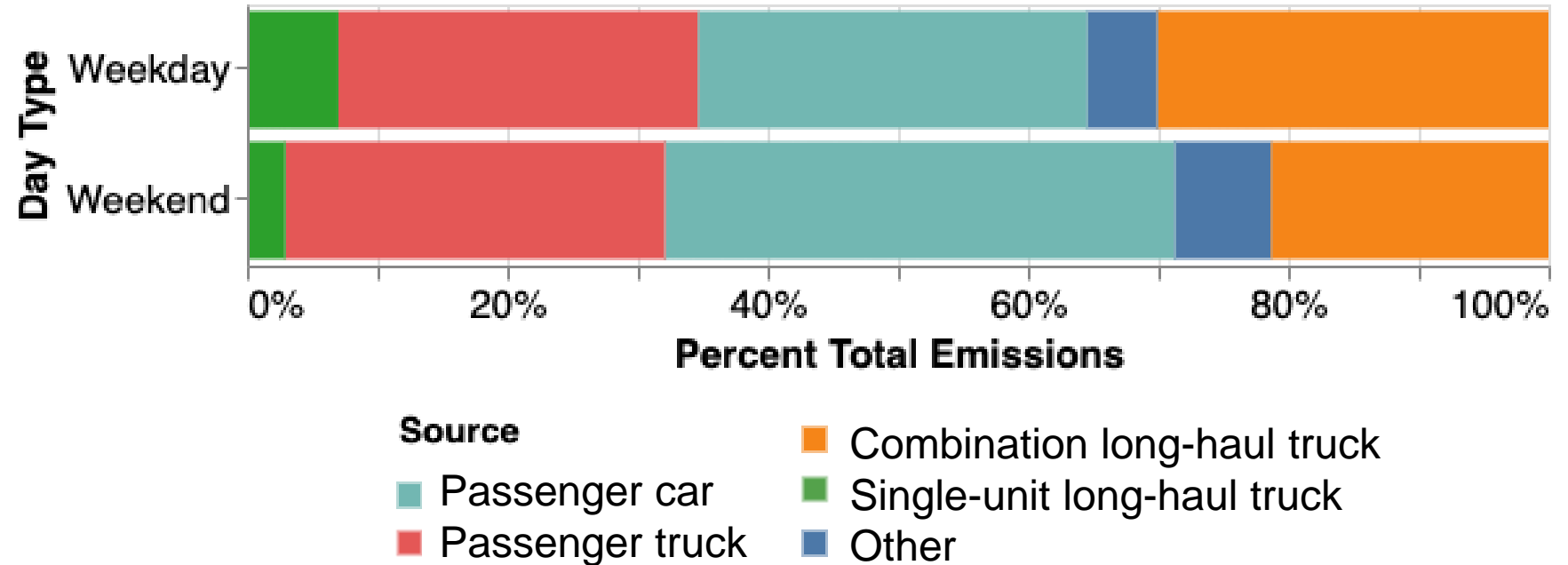
2050 Emissions by Month by Source Type for June 2020 Conformity Run



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

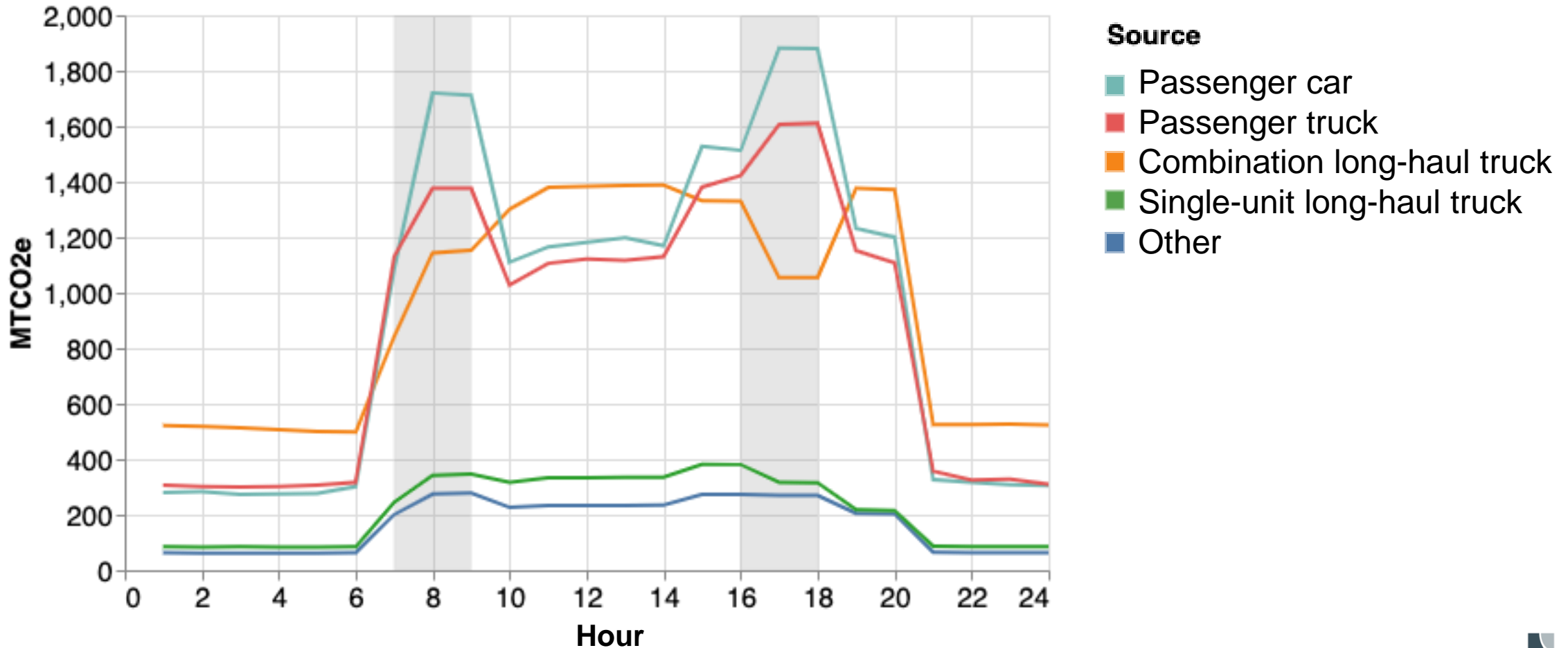
Percent Total 2050 July Emissions by Source Type and Day Type for June 2020 Conformity Run
Weekend VMT 29% less than weekday VMT. Truck VMT down 62% on weekend, passenger VMT down 26%.

Weekend emissions
38.5%
less than
weekday
emissions

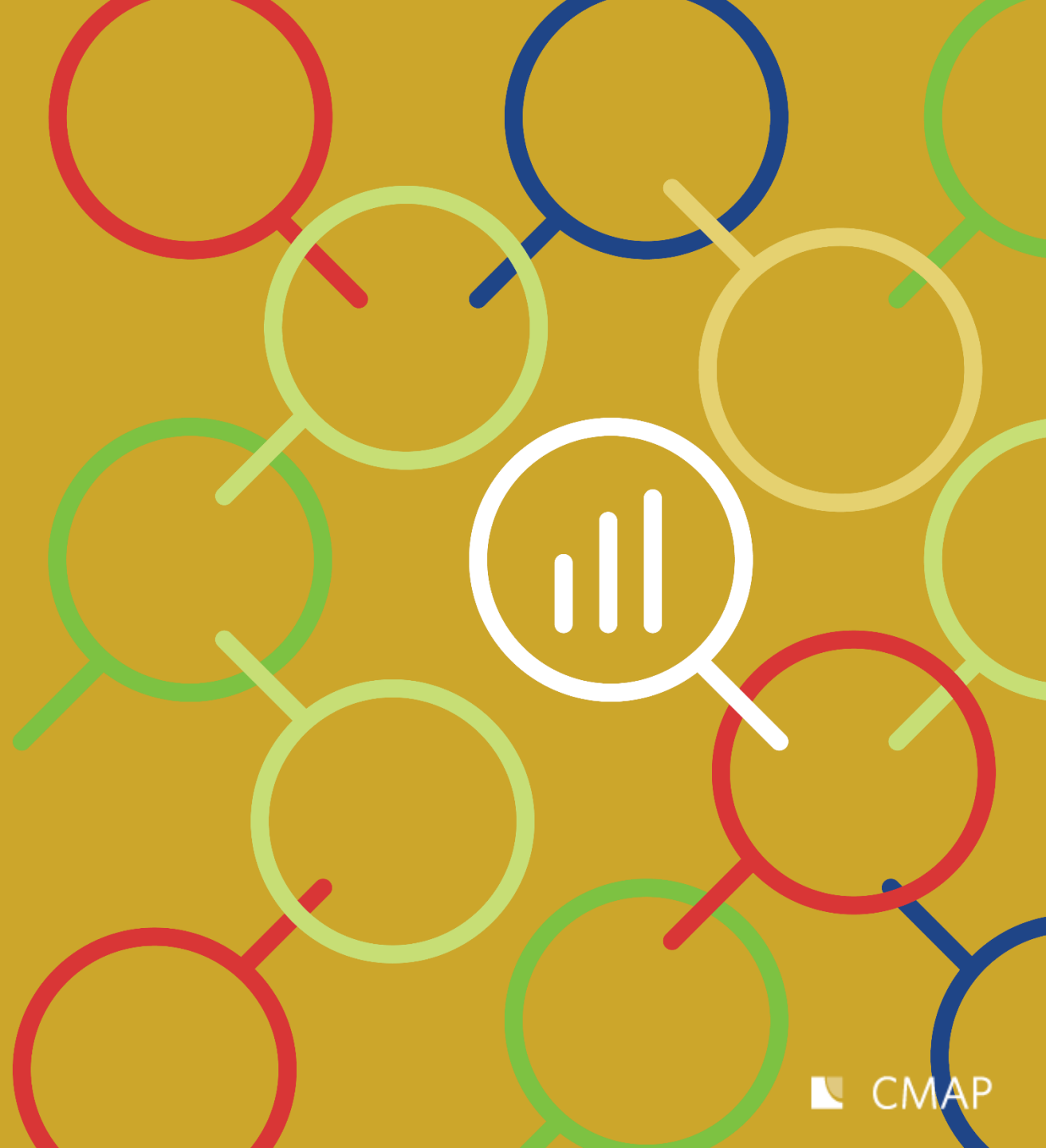


Passenger vehicle emissions peak during AM and PM peak travel periods

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

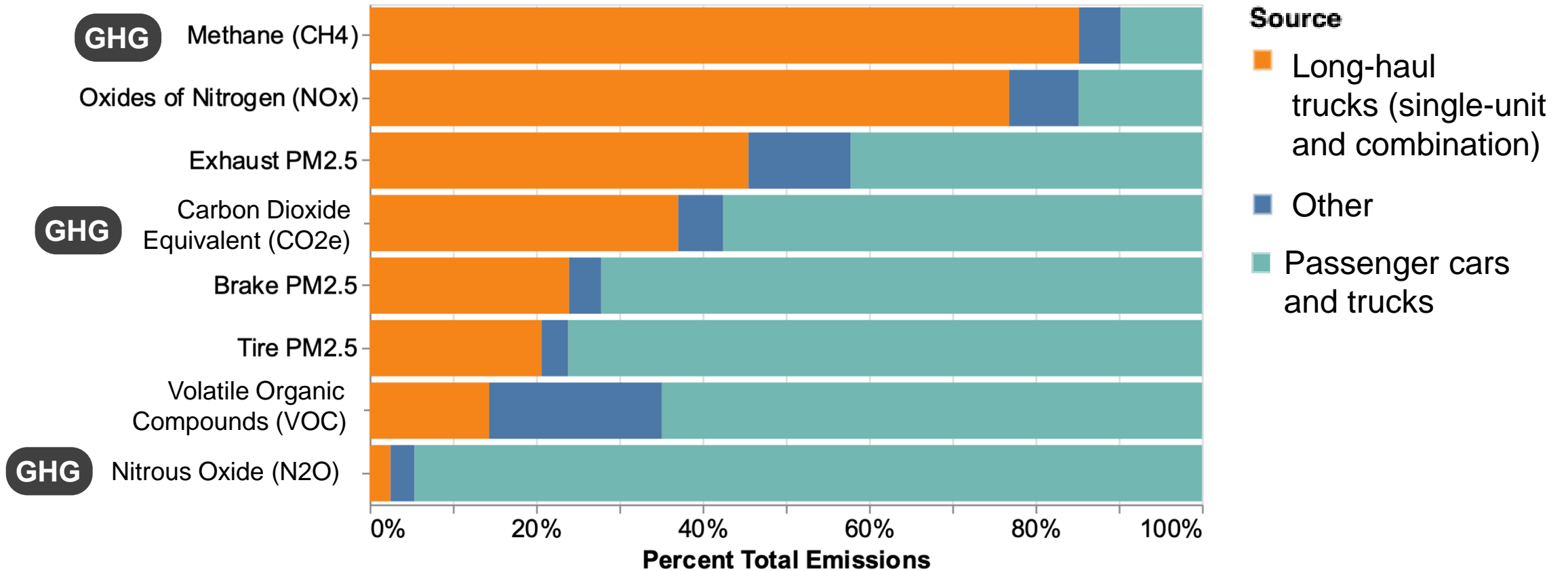


What about **other**
pollutants?



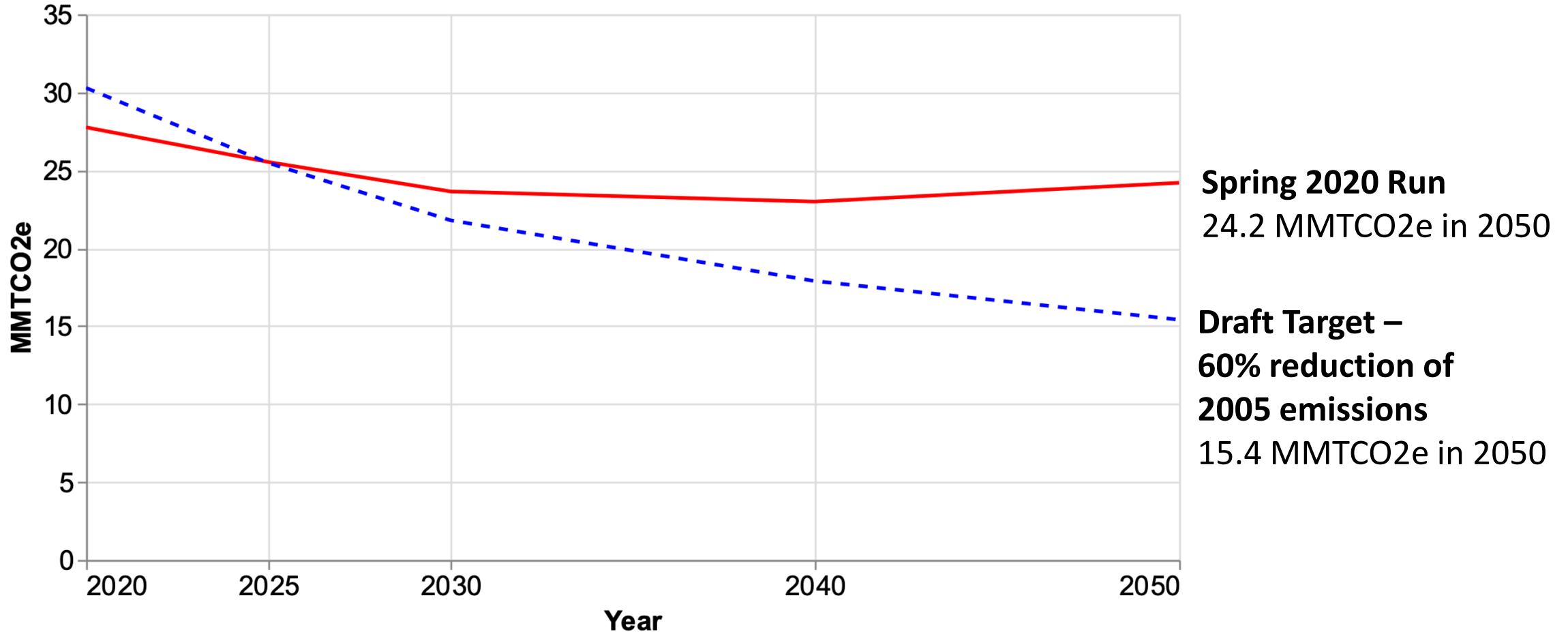
Trucks major sources of methane, NOx, and exhaust PM2.5, while passenger vehicles top sources of brake and tire PM2.5, VOC, and N2O

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



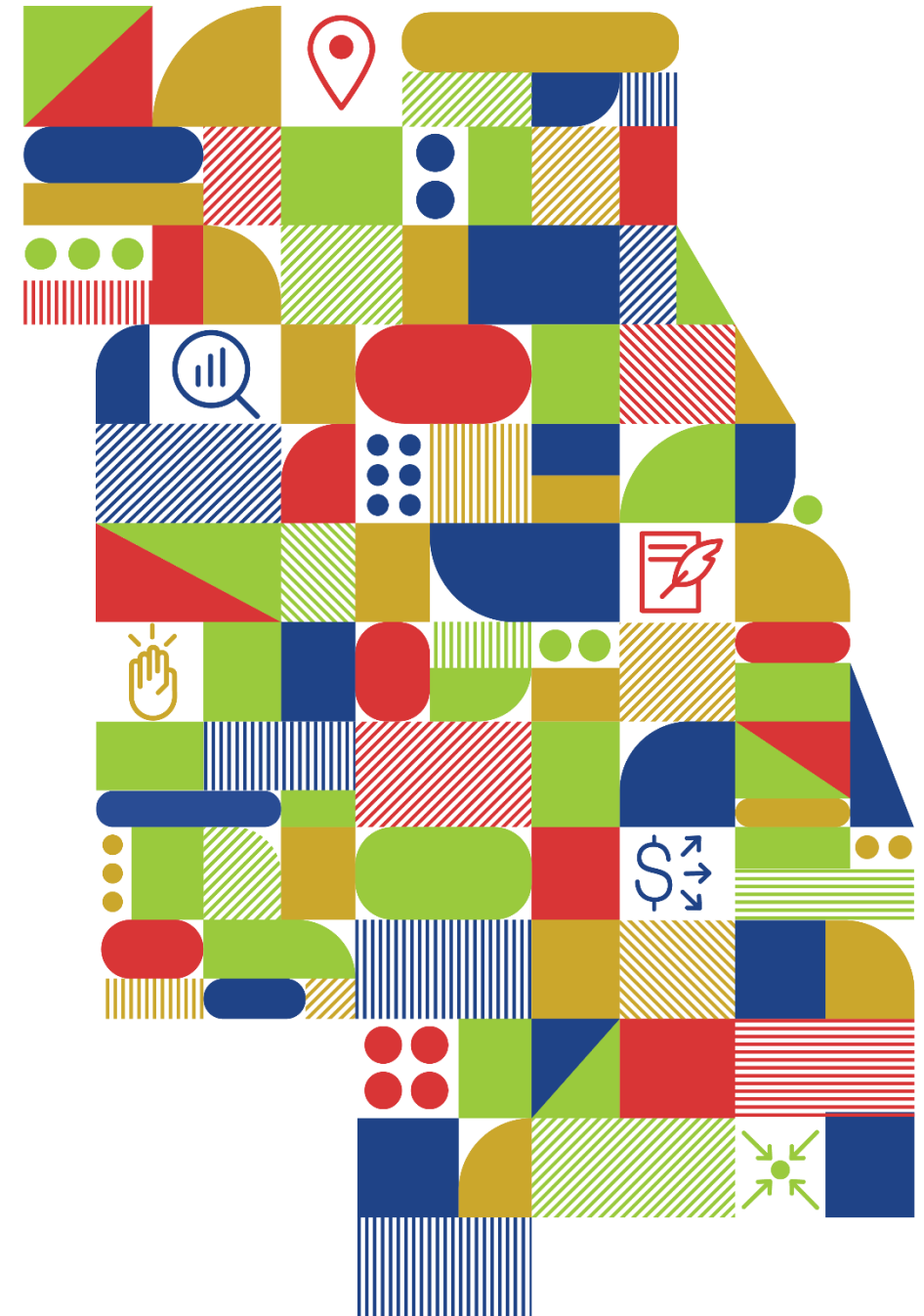
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Transportation Climate Mitigation Strategies

December 7, 2020





2015 Regional Emissions by Sector

Project Purpose

Examine potential contributions the region can make toward reducing GHG emissions from the transportation sector.
(Specifically on road transportation)

- Identify pathways for mitigation
- Increase understanding by CMAP staff and partners of GHG impacts of transportation decisions
- Prepare CMAP and the region to respond to future legislation or other initiatives aiming to reduce GHG emissions
- High level quantification of various GHG mitigation strategies

Scope



Past modeling

Figure 2: Gain in mode share at low and high levels of strategy implementation, 2015

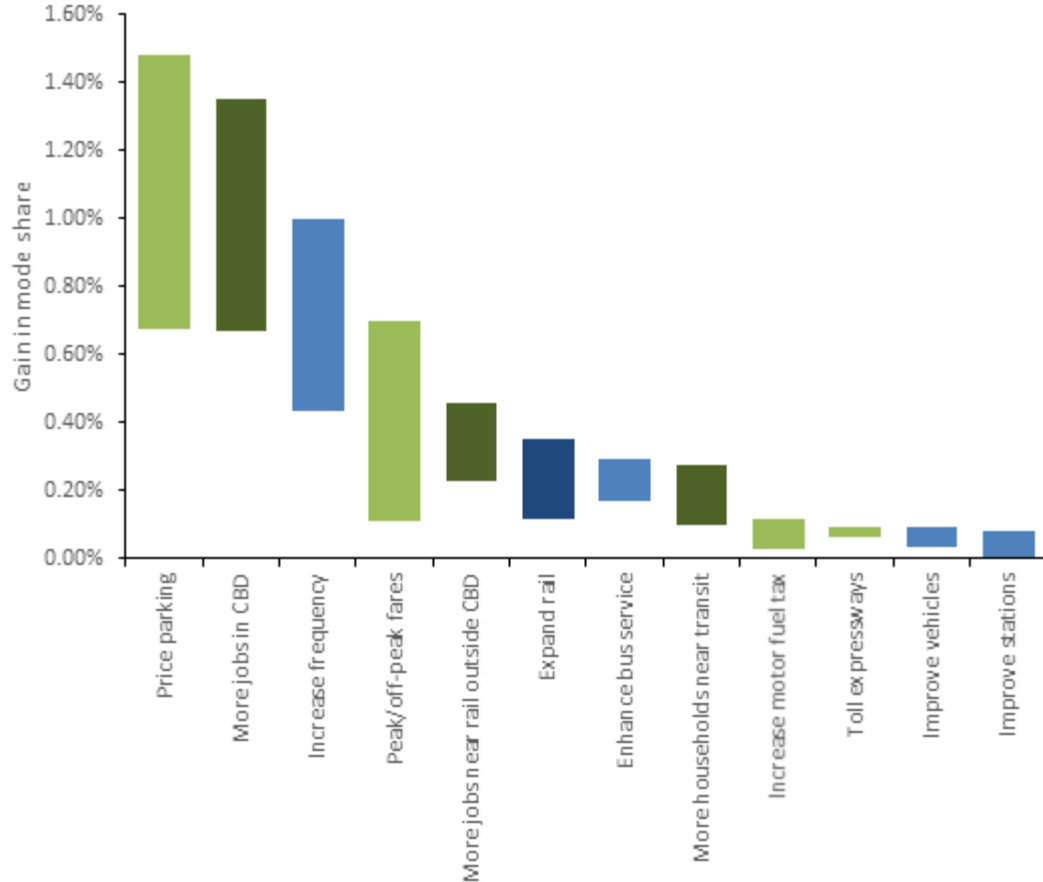
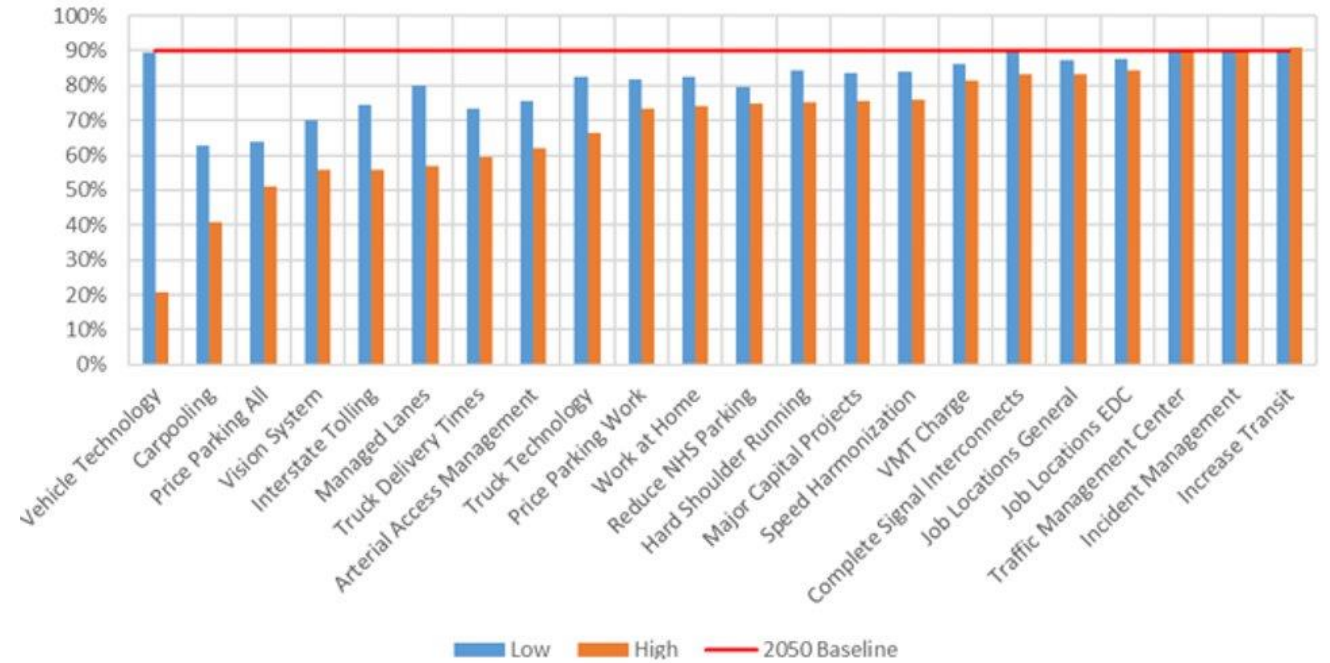


Figure 4: 2050 vehicle hours of travel under congested conditions compared to 2015



Modeling

Socioeconomic forecast

- Population
- Employment
- Location of Pop. & Emp.

Transportation network

- Regionally Significant projects
- Cost (tolls, gas)

Trip based model
(travel behavior)

VHT by vehicle/speed
classification

EPA MOVES
model (pollutant
emissions)

Fleet profile (age, fuel, type)
Environment

Scenarios

Trip Base Model + MOVES

- Transit RSPs
- Highway RSPs
- Increase transit use
- Driving cost
 - Price parking
 - Tolling/ congestion pricing
 - VMT or GHG tax
- Speed harmonization (safety+)
- Congestion reduction technologies
- Increase work from home

MOVES only

- Electrify cars
- Electrify freight
- Electrify transit
- More efficient vehicles (CAFE standards)
- Other alternative fuels

Future Analysis / Out of Scope

- Land use
- Air / Marine
- Electricity source
- Manufacturing / materials

Looking for your input

What strategies or policies could impact freight emissions the most?

What would you like to know about potential paths to reducing transportation green house gases?

What are future actions for CMAP and partners to pursue? How can CMAP data support those efforts?



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