



# GHG Estimation Procedures

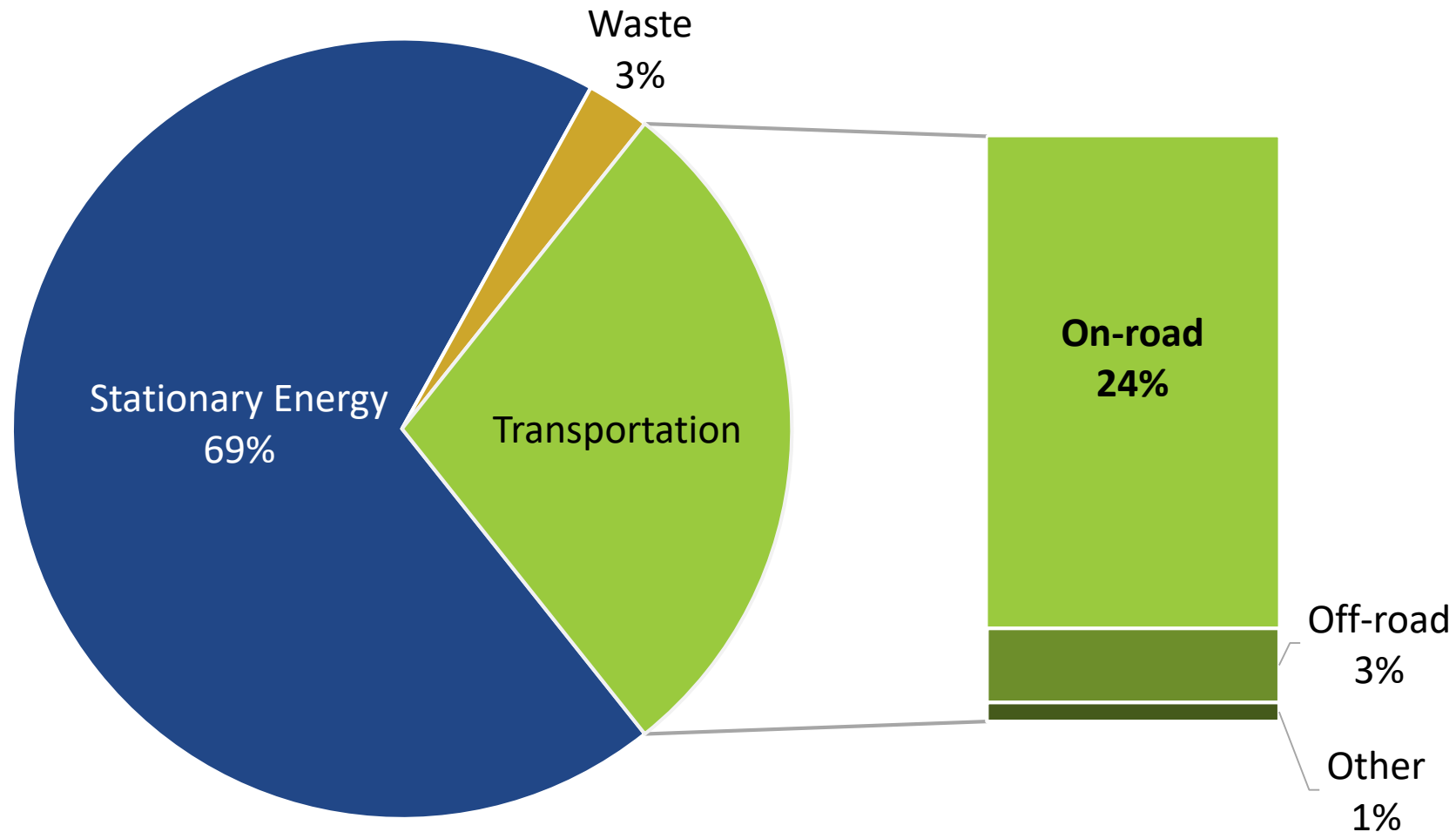
## *Tier II Consultation*

May 24, 2021



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

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



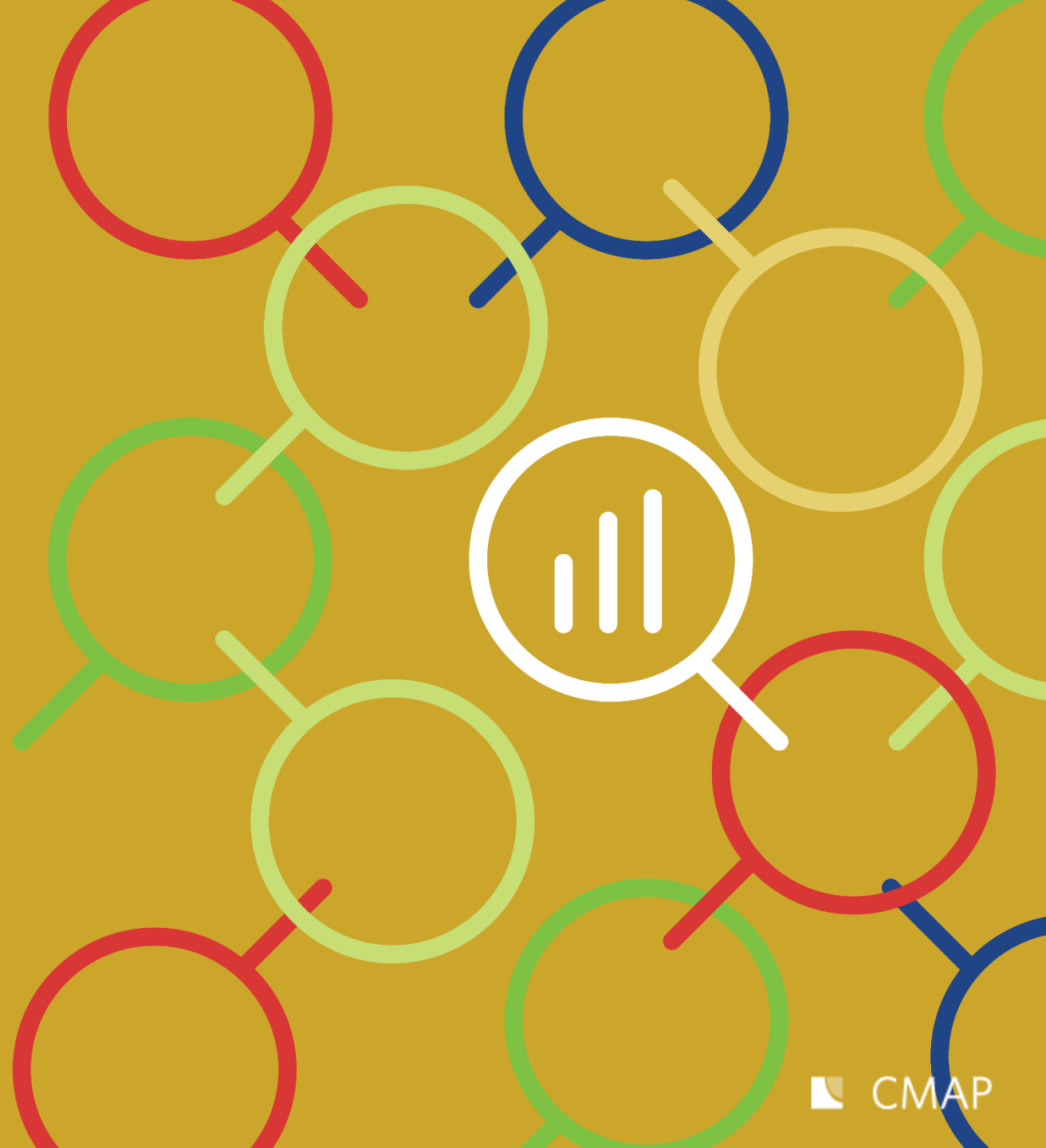
# CMAP GHG evaluation needs:

1. Informational to accompany conformity findings
2. Input to project programming decisions
3. Regional Significant Project evaluation for ON TO 2050
4. Transportation mitigation strategies project
5. Support greenhouse gas inventories
6. *Major capital project studies*

# Two current estimation processes

1. MOVES used in inventory mode to accompany conformity memo
2. Rates mode MOVES results applied to modeled results

# Focus on rates mode for GHG estimation



# Running rates and starts rates

1. Tables were generated in 2017 and still in use
2. Rates generated for every year until 2050
3. Tables are available for GHG, NOx, PM2.5, & VOC
4. Running rates include rates for each modeled vehicle class, hour of day, speed bin (1-16)
5. Starts rates are available for passenger vehicles (motorcycles, passenger cars, passenger trucks)

# Example GHG tables

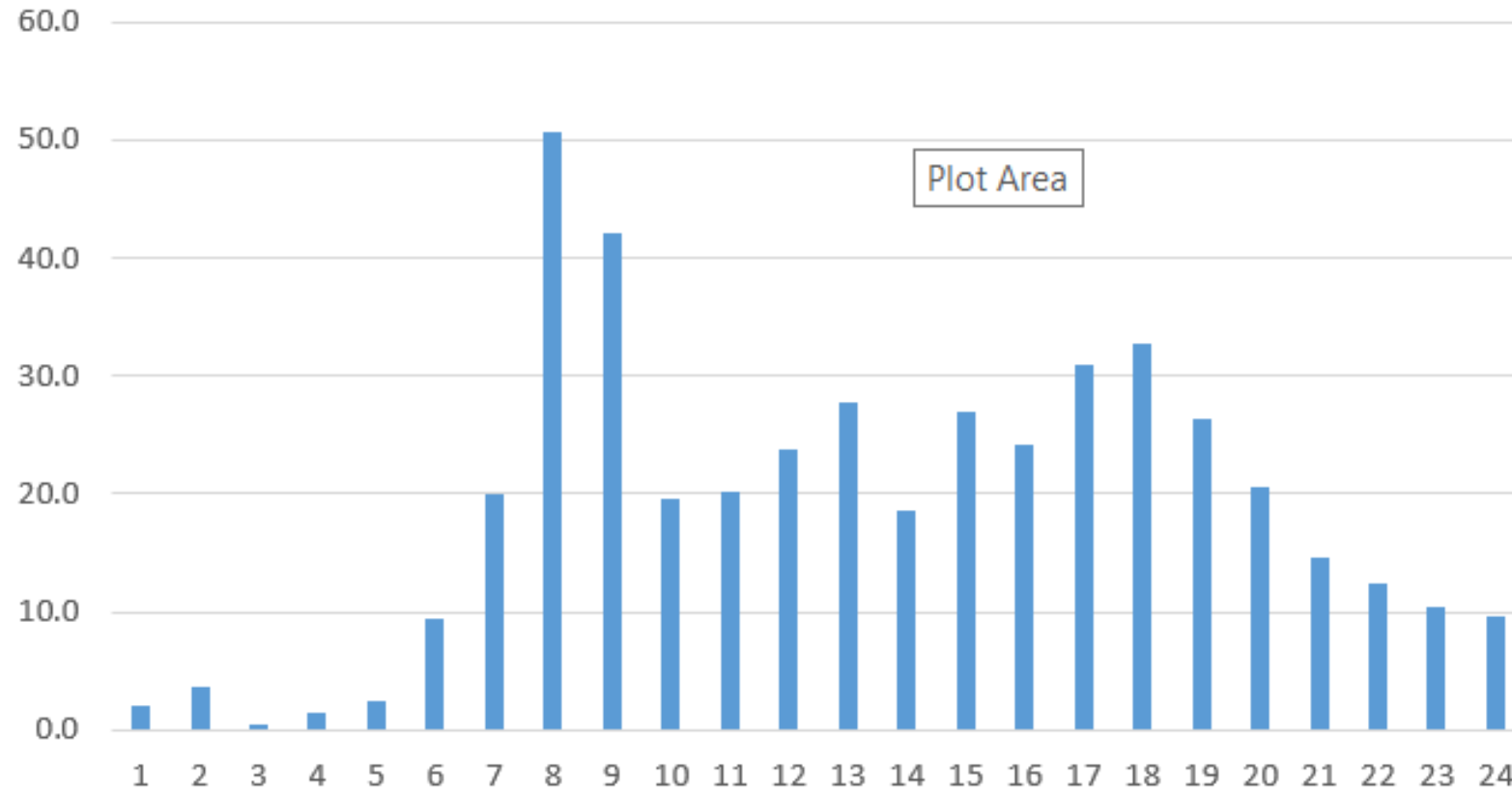
Running rates GHG

yearID	monthID	dayID	pollutantID	processID	hourID	roadTypeID	avgSpeedBin ID	sourceTypeID D	coalesce(rate perdistance, 0)
2015	7	5	98	1	1	2	1	11	1332.98
2015	7	5	98	1	1	2	2	11	764.629
2015	7	5	98	1	1	2	3	11	485.208
2015	7	5	98	1	1	2	4	11	410.771

Starts rates GHG

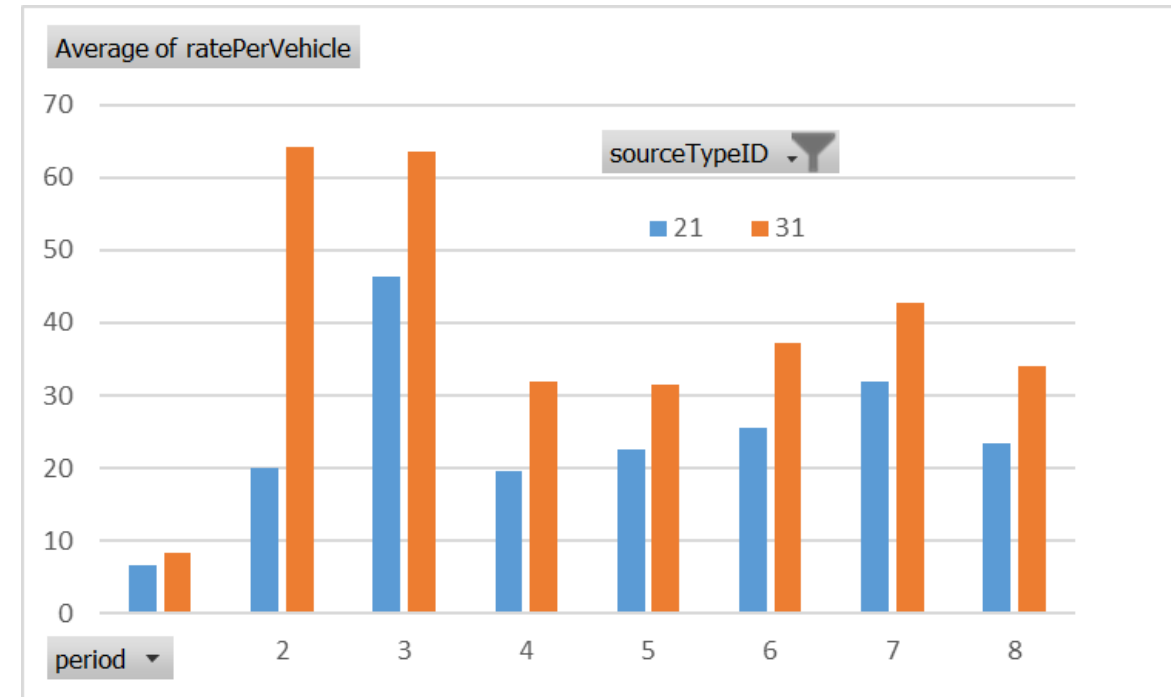
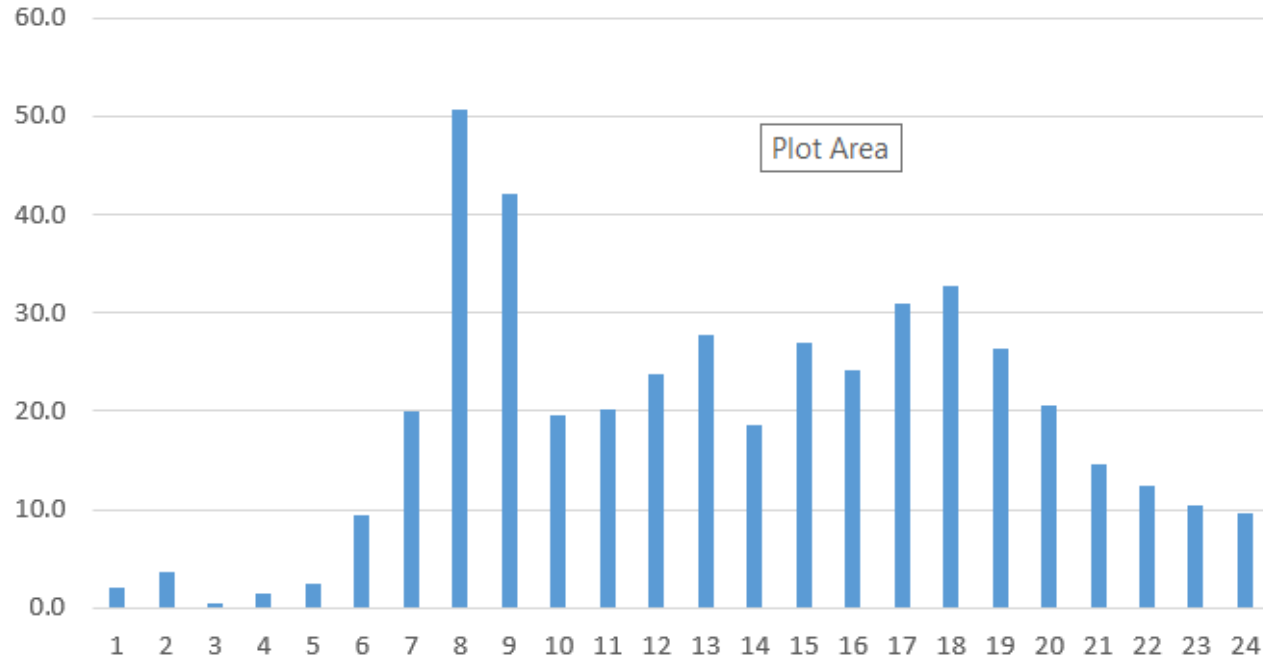
yearID	monthID	dayID	pollutantID	processID	hourID	sourceTypeID	ratePerVehicle
2015	7	5	98	2	1	11	0.390091
2015	7	5	98	2	1	21	2.14933
2015	7	5	98	2	1	31	3.61439
2015	7	5	98	2	2	11	0.366817
2015	7	5	98	2	2	21	3.65235
2015	7	5	98	2	2	31	1.28734

# Confusing starts rates





# Aggregating starts rates



# Apply rates

1. Run the regional model
2. Export the highway network performance data
3. Aggregate the vehicle miles traveled for vehicle class, speed bin, and road type
4. Match the average running rates from the rates table by vehicle class, speed bin, and road type - multiply
5. Calculate the number of passenger vehicle trips in the region by time of day and match them to the starts rates - multiply

# Final thoughts

1. Take care when applying the method to small geographies
2. For projects the smallest geography to consider should be a corridor
3. We have to understand more about starts rates



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