



EMFAC202x

Mobile Source Analysis Branch
Air Quality Planning and Science Division
California Air Resources Board

January 5, 2021

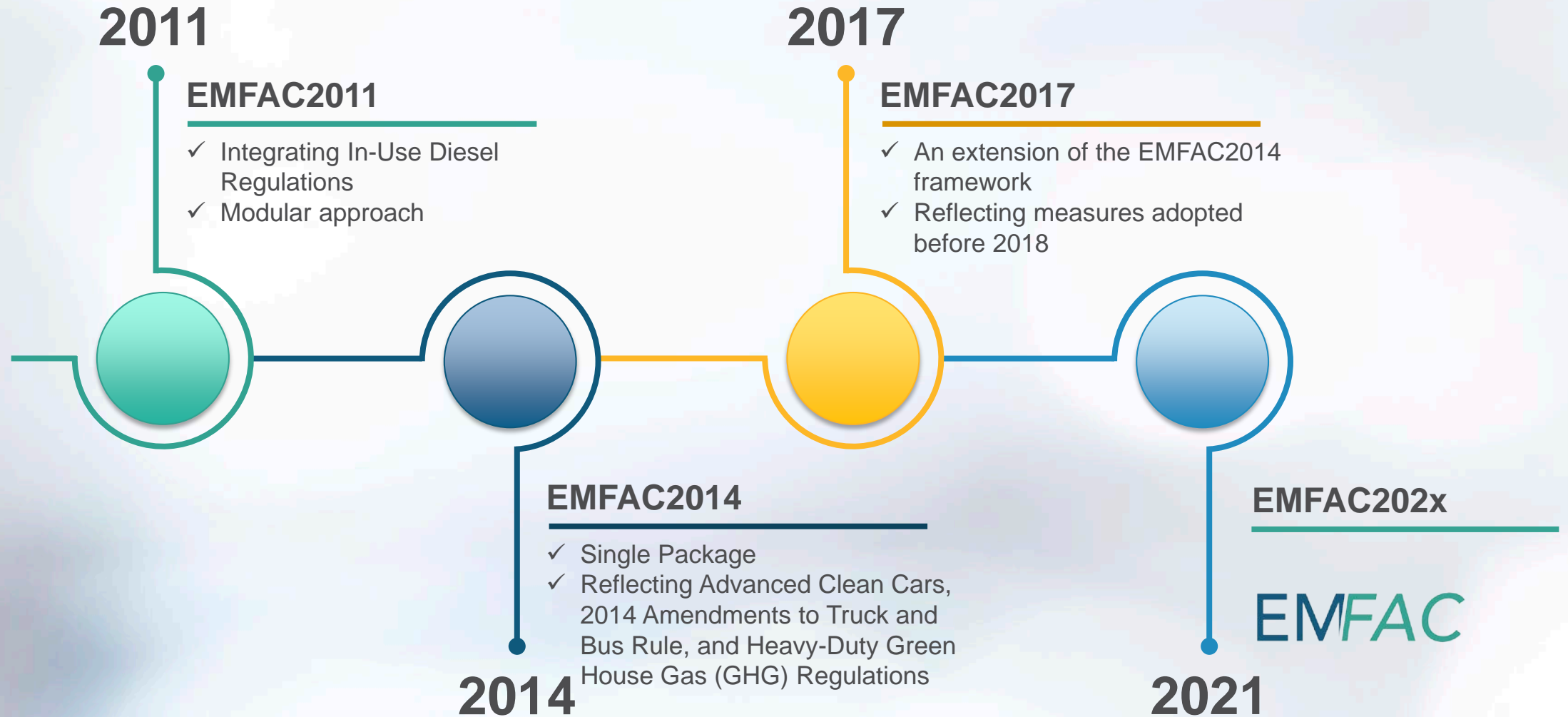
Background of EMFAC

- California specific with USEPA approval
- More than three decades of data collection and methodology refinement
- Advanced Data Mining and Analysis
- Real World Emission Testing
- Use of Big Data (e.g., Telematics)
- Integrated modeling

EMFAC



A Decade of EMFAC Updates



EMFAC202x Updates

New web interface <https://arb.ca.gov/emfac/>

- Full functionality
- Modern and friendly
- Fast and easy

Data Updates

- Vehicle population
- Vehicle activity
- Emission rates

New model features

- PHEV/Natural Gas
- Energy module
- Ammonia
- Vocational trucks

New forecasting framework

- Consumer choice model
- Travel demand model



Modern Web Interface

Presenting
 the new
 Database

EMFAC CALIFORNIA AIR RESOURCES BOARD

EMISSIONS INVENTORY PROJECT ANALYSIS SCENARIO ANALYSIS **FLEET DATABASE**

Fleet Database

This tool provides access to onroad vehicle population estimates for California at the Census Block Group level. The estimates are generated based on vehicle registration data from California Department of Motor Vehicles.

Region Type 👉 Sub-Area County Metropolitan Planning Organization Statewide **Zipcode**

Region 👇 95814 92507

Calendar Year 👇 2019

Vehicle Category 👉 **Aggregate** **Select** Deselect All Gross Vehicle Weight Rating (GVWR) class output

P, Passenger Cars T1, Light-duty trucks (GVWR <8000 lbs, ETW<3750 lbs)
 T2, Light-duty trucks (GVWR <8000 lbs, ETW 3751-5750 lbs)
 T3, Medium-duty vehicles (GVWR 8000-8500 lbs)
 T4, Light-heavy duty trucks (GVWR 8501-10,000 lbs)
 T5, Light-heavy duty trucks (GVWR 10,001-14,000 lbs)
 T6, Medium-heavy duty trucks (GVWR 14,001-33,000 lbs)
 T7, Heavy-heavy duty trucks (GVWR>33,000 lbs) BS, School buses
 BT, Urban buses B, All other buses MH, Motor Homes MC, Motorcycles

Fuel Type **Aggregate** **Select**

Fuel Technology **Aggregate** **Select** Deselect All

ICE (internal combustion engine, including conventional hybrid)

Vehicle Population Updates



Real World Vehicle Activity



California Vehicle Inventory and Use Survey (VIUS)

Replaced the Federal VIUS (discontinued)



Collection of truck activity data through Telematics service providers

Portable Activity Measurement System (PAMS)



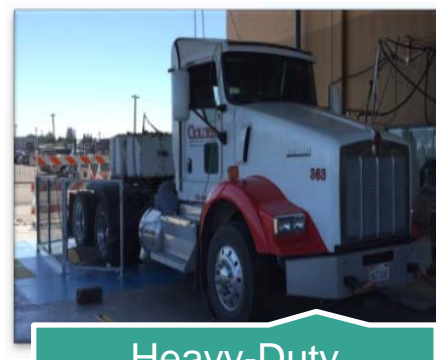
PAMS provides Information on:

- Vehicles miles traveled
- Idling/hoteling
- Drive cycles

Latest In-Use Emissions Data



Light-Duty



Heavy-Duty
(Diesel and CNG)



Motorcycle



On-Board Diagnostic
(OBD)



PHEV



Brake-Wear

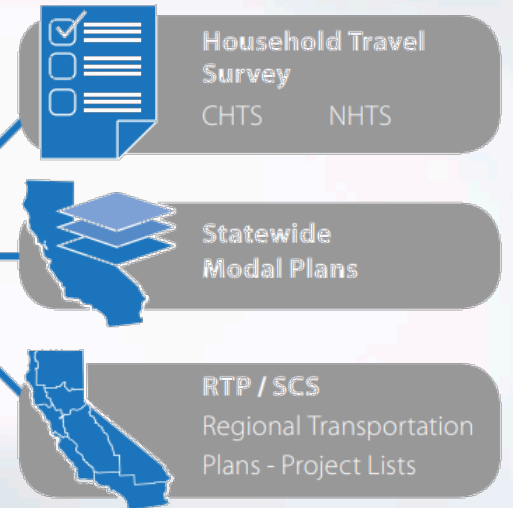
New Forecasting Frameworks



Utilizing vehicle choice models from California Energy Commission (CEC) to forecast Light-Duty (LD) zero-emission vehicle (ZEV) sales



Utilizing statewide travel demand models from Caltrans to forecast Heavy-Duty (HD) Vehicle Miles Travelled (VMT)



New Features

Expanded Fuel Technologies

Plug-in Hybrids



Natural Gas



More Pollutants



AMMONIA

Vocational Truck Categories



Electricity Consumption



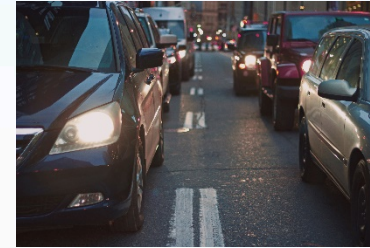
Latest Regulatory Measures



HD Vehicle Inspection Program (HDVIP)/
Periodic Smoke Inspection Program (PSIP)



Innovative Clean Transit (ICT)



SAFE Part One & Final Rule



HD Omnibus



HD Warranty



Zero Emission (ZE) Airport Shuttle Bus



Advanced Clean Trucks (ACT)



Overall Trends Relative to EMFAC 2017

Light-Duty

| Updated Category | NOx | PM2.5 | CO2 |
|------------------------|-----|-------|-----|
| VMT/new sales | ↓ | ↓ | ↓ |
| Exhaust Emission Rates | ↑ | | |
| PM Brake Ware | | ↓ | |
| SAFE Rule | | | ↑ |



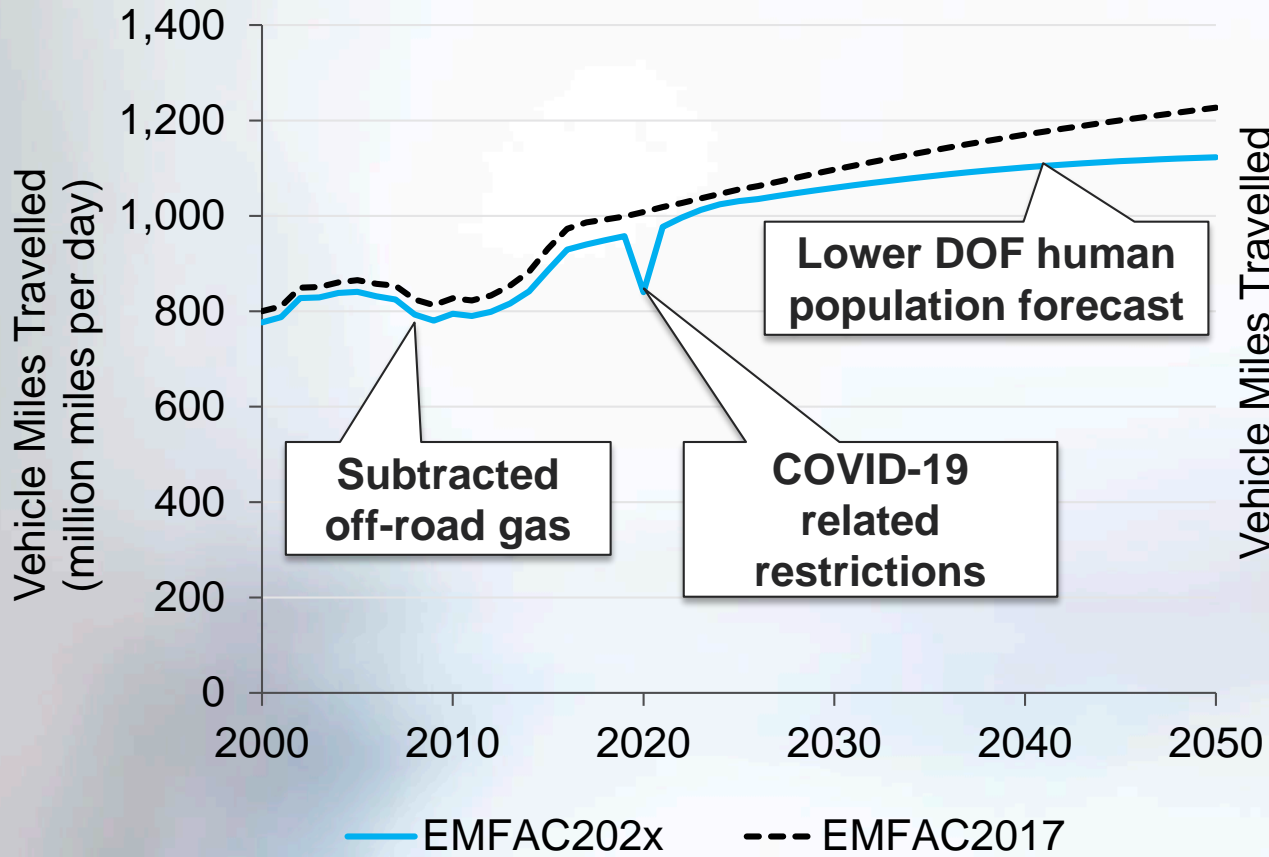
MD/HD

| Updated Category | NOx | PM2.5 | CO2 |
|------------------------|--------------------|-------|-----|
| VMT/new sales | ↑ | ↑ | ↑ |
| Exhaust Emission Rates | ↑ | ↓ | ↓ |
| Mileage Accrual | Depending on fleet | | |
| Regulations | ↓ | ↓ | ↓ |

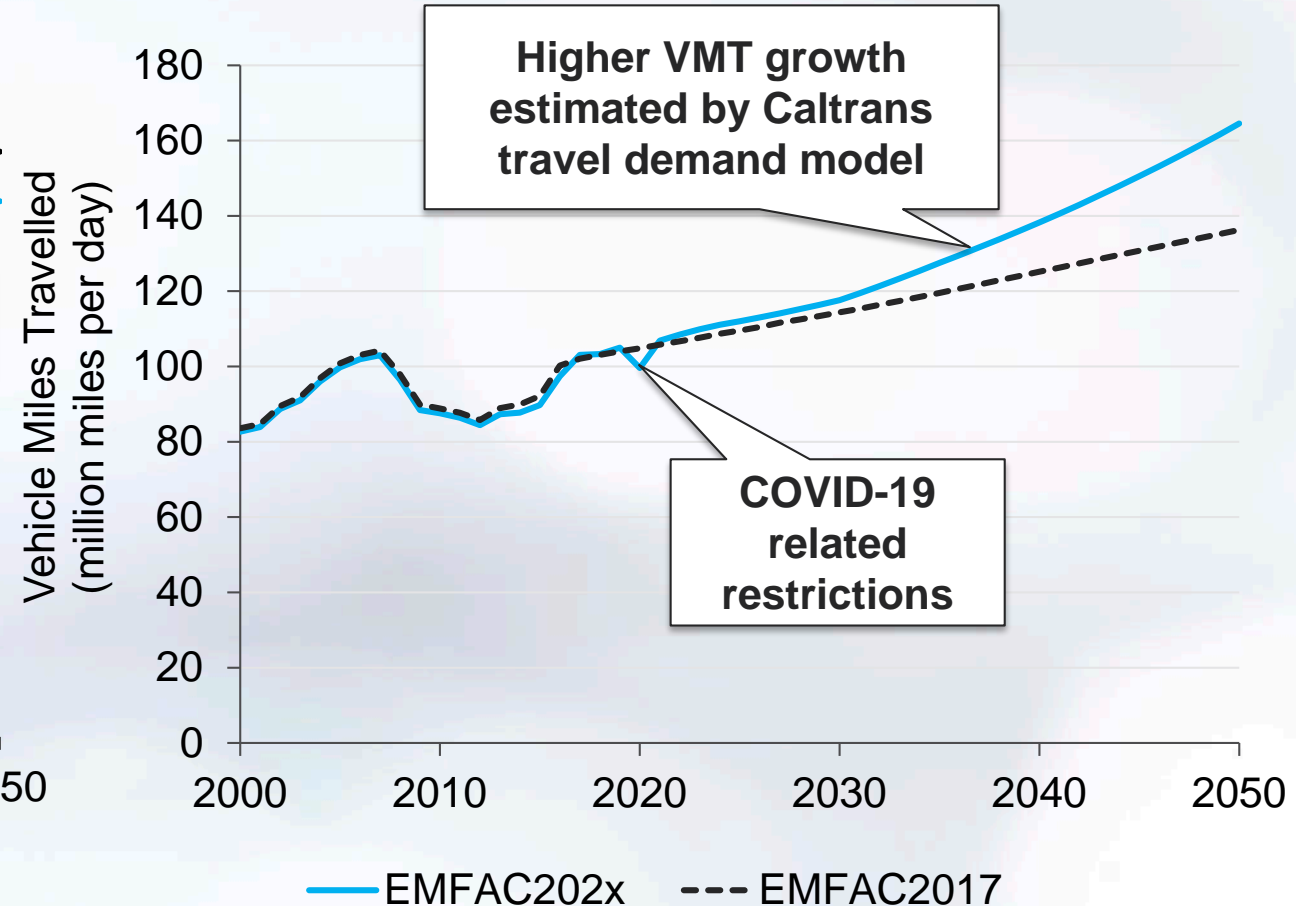


VMT - Statewide

Light-Duty (GVWR ≤ 8,500 lbs)

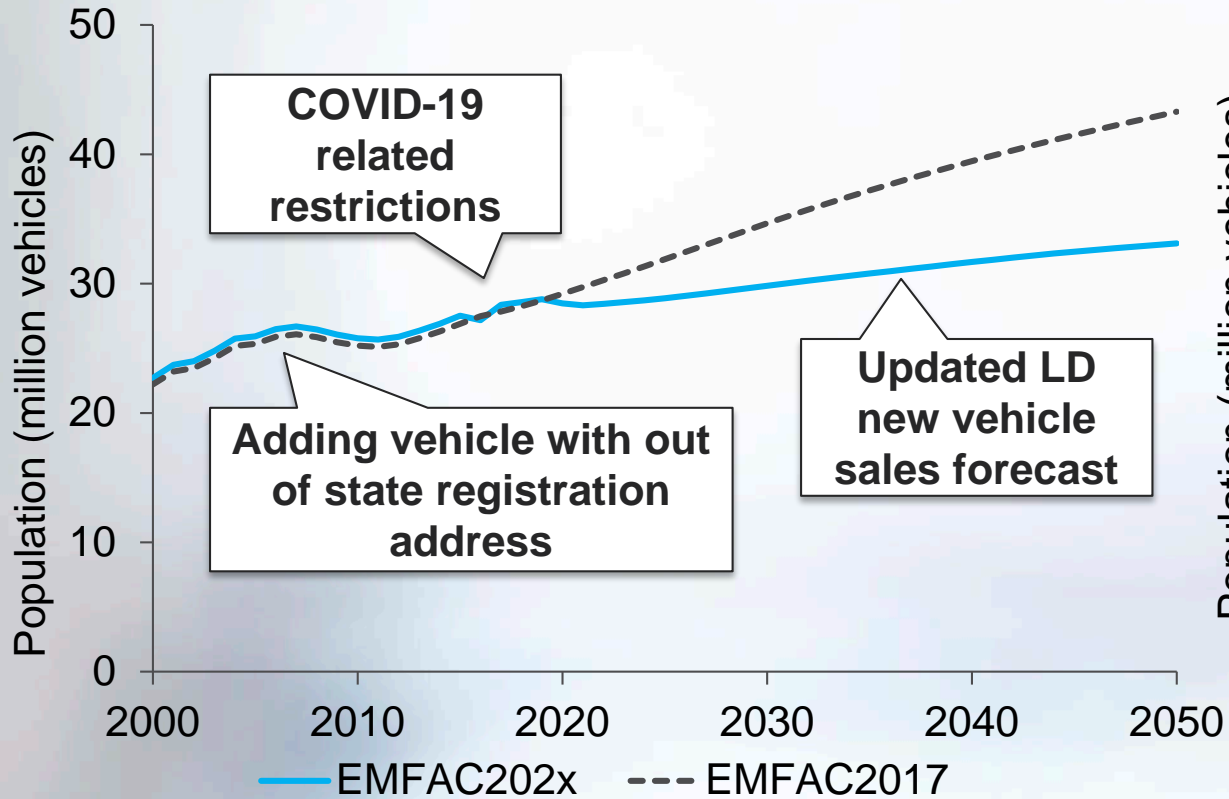


Medium and Heavy-Duty (GVWR > 8,500 lbs)

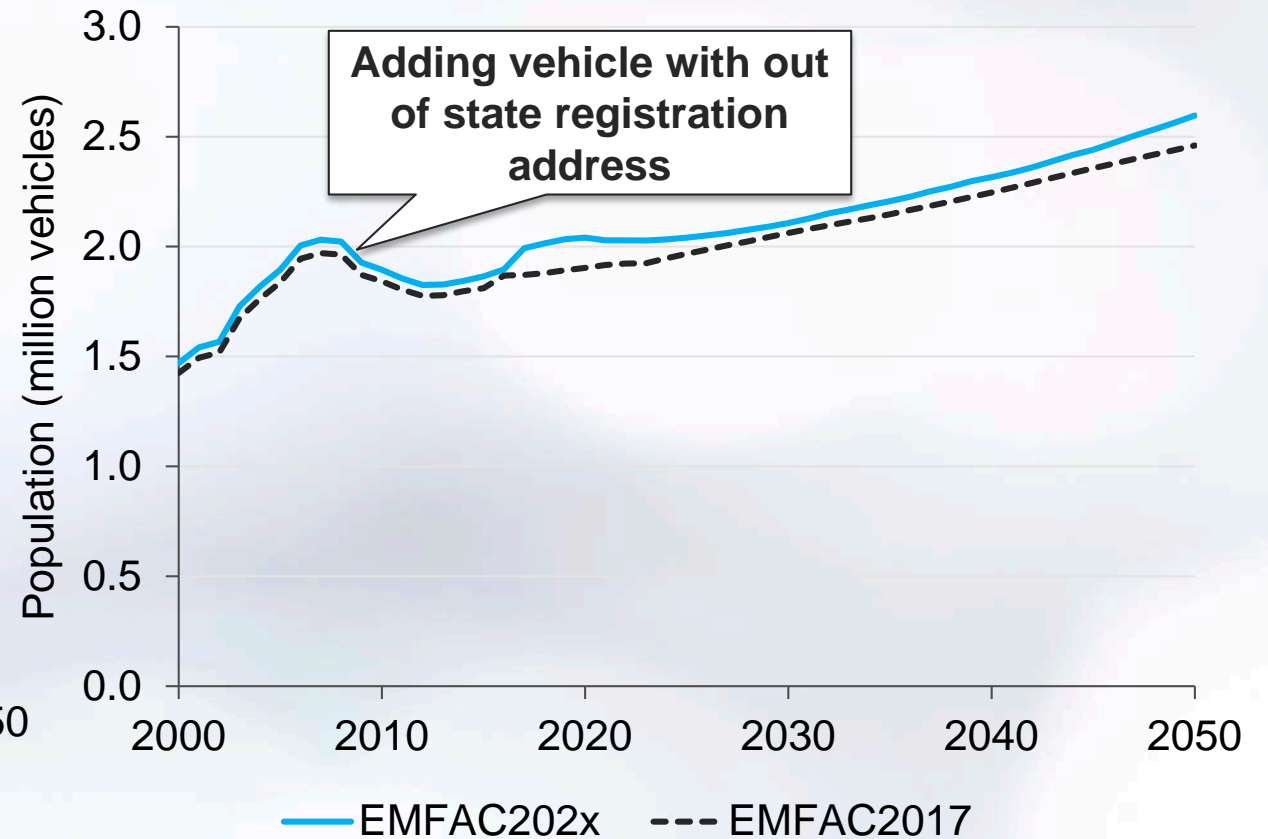


Population - Statewide

Light-Duty (GVWR ≤ 8,500 lbs)

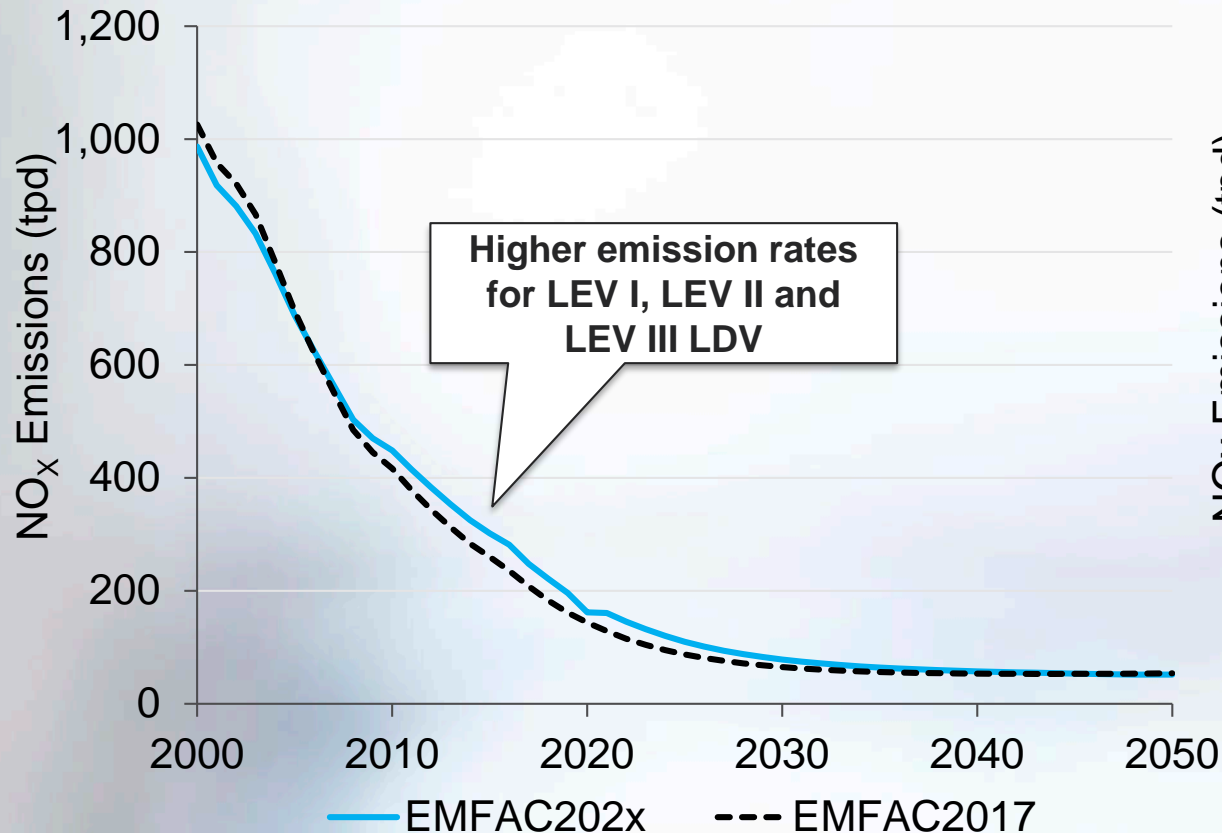


Medium and Heavy-Duty (GVWR > 8,500 lbs)

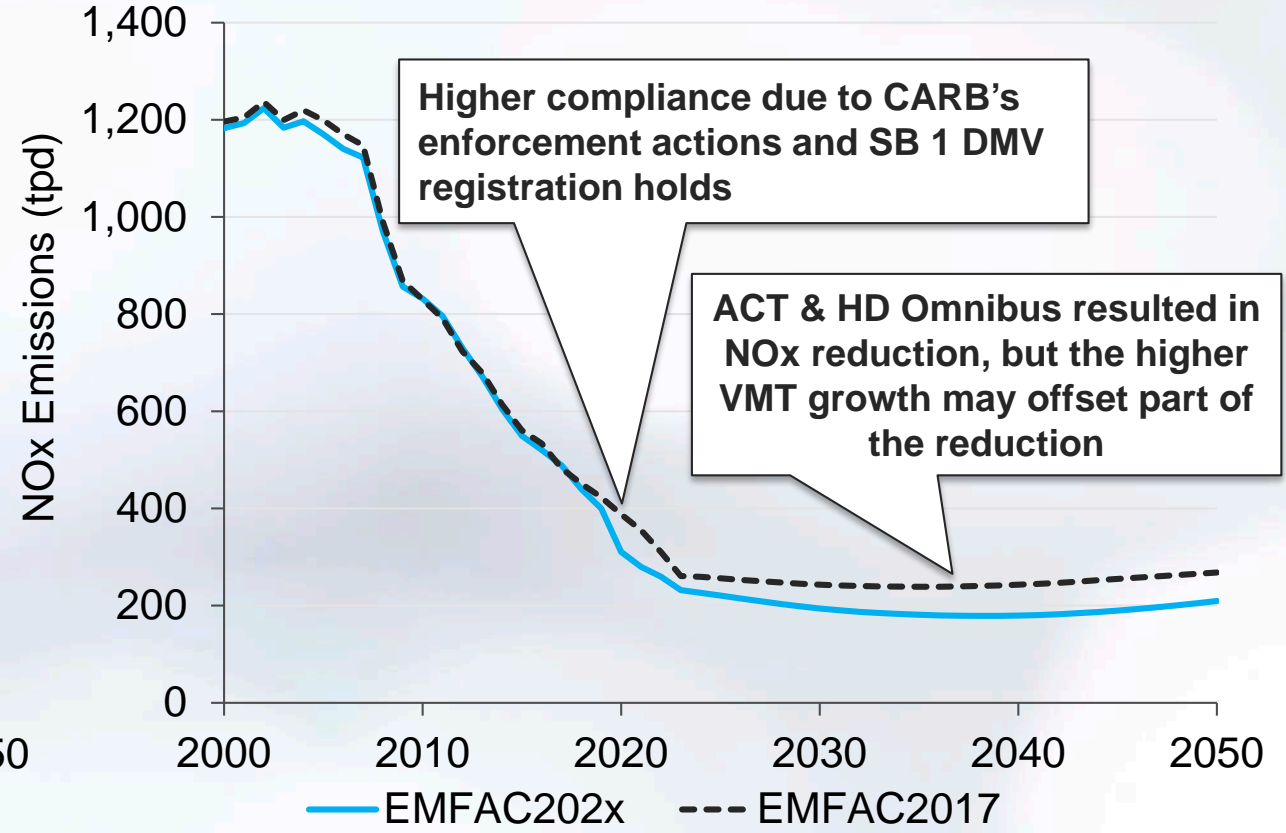


NOx Emissions – Statewide

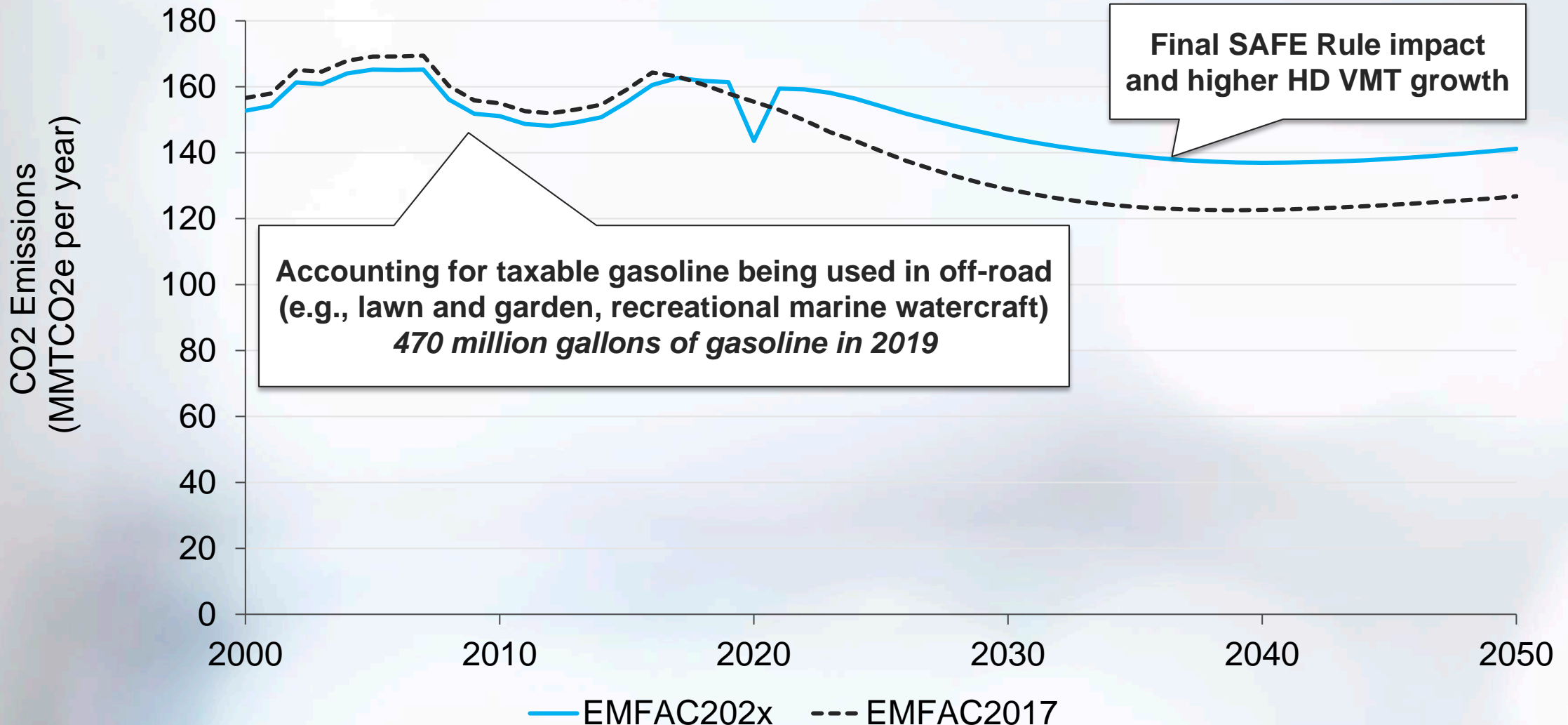
Light-Duty (GVWR ≤ 8,500 lbs)



Medium and Heavy-Duty (GVWR > 8,500 lbs)



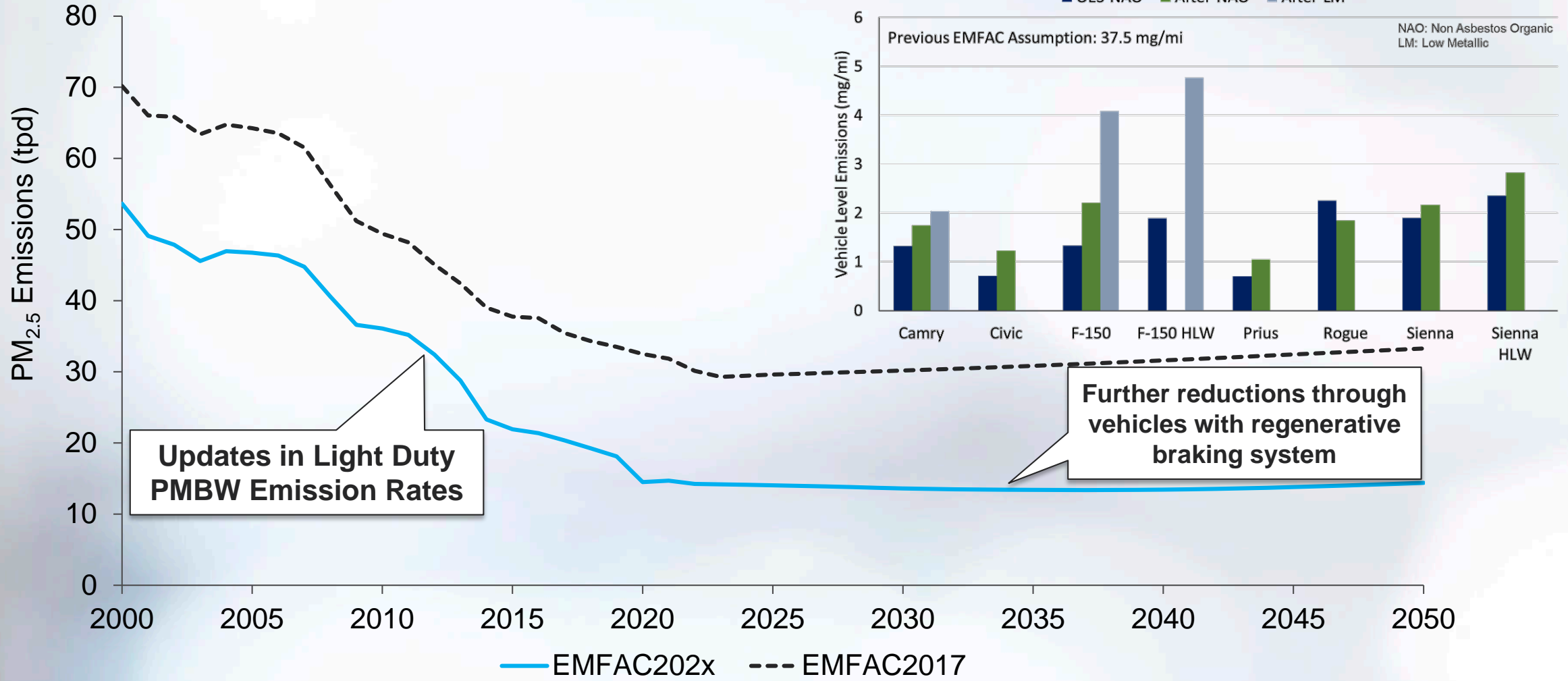
CO₂ Emissions – Statewide



PM_{2.5} Emissions – Statewide

Includes Tire and Brake Wear

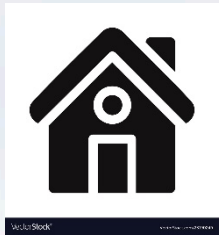
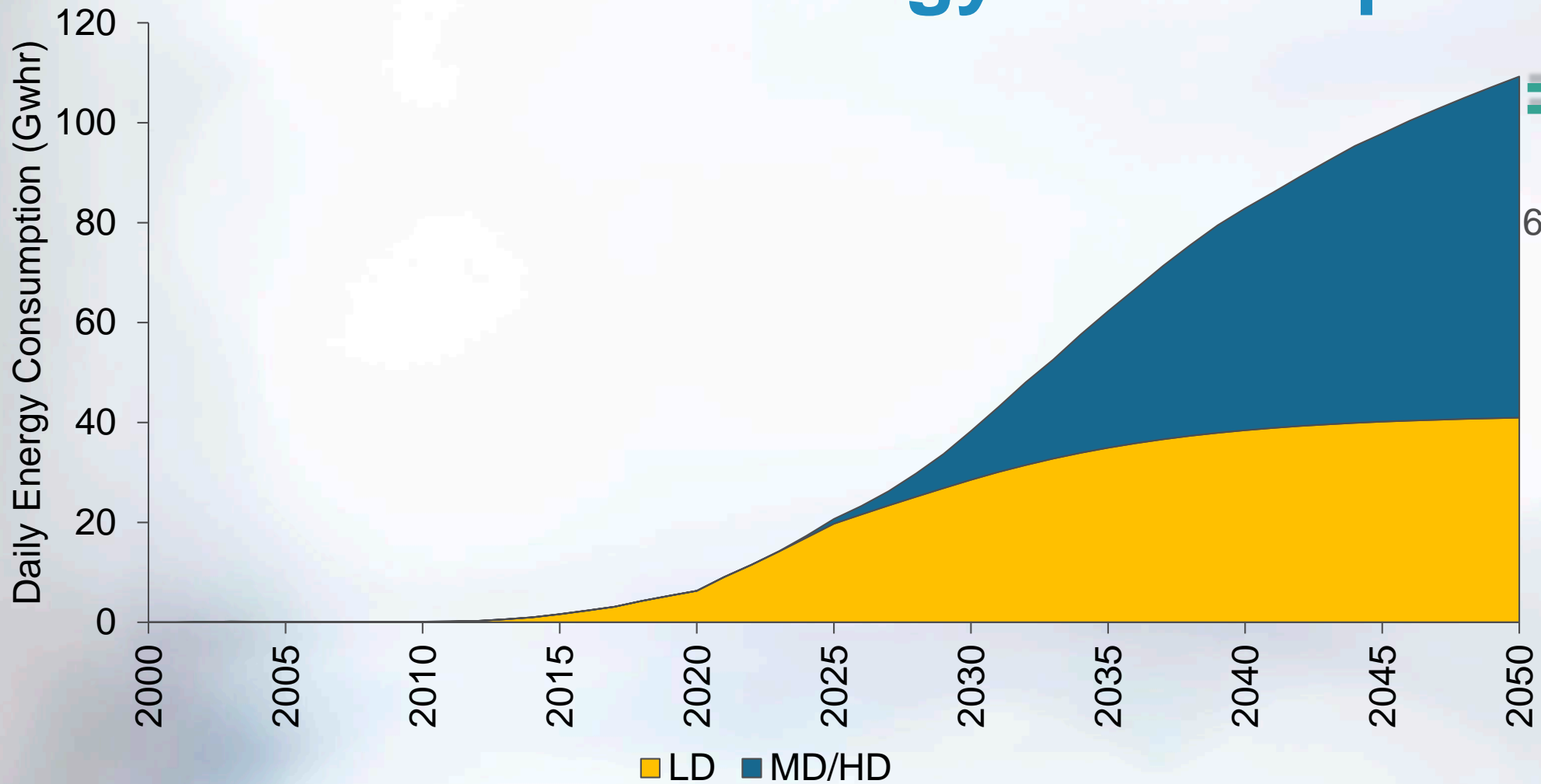
EMFAC202x July Workshop



(preliminary results - subject to change)

NEW!

Statewide Energy Consumption



6 million households

California electricity usage ~700-800 GWh daily – energy.gov

(preliminary results - subject to change)

Looking Forward to

- **EMFAC202x application** to inform and support upcoming policies and regulations, e.g.
 - Heavy-duty Inspection and Maintenance (HD I/M)
 - Advanced Clean Fleet rule (ACF)
 - Advanced Clean Car 2.0 (ACC 2.0)
 - On-Road Motorcycle (ONMC)
- **Next version of EMFAC in 2023/2024**
 - Fleet information by industry/vocational type
 - ALPR data to better understand truck traffic
 - Real world emission and performance data – OBD REAL and PEAQS
 - Lab and field testing to update emission rates

Questions and Comments

- For questions and comments:

EMFAC@arb.ca.gov

- EMFAC web platform at:

<https://arb.ca.gov/emfac/>

- More information at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory>