

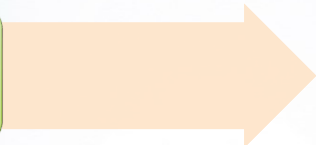


Future EMFAC Development: Higher Spatial Resolution Emission Inventory

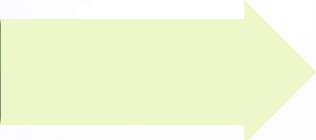
Jiachen Zhang (presenter), Mo Chen, Sara Forestieri, Stephanie Kong, Alondra Moreno,
Sherrie Sala-Moore, Seyyed Ali Davari, Satya Sardar, David C. Quiros
California Air Resources Board

Background of EMFAC

Vehicle Activity Updates



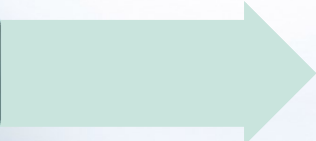
Latest Emission Testing Data



New Features



New Forecasting Frameworks



Latest Regulatory Measures



Scoping plan



State Implementation Plan



Transportation Conformity

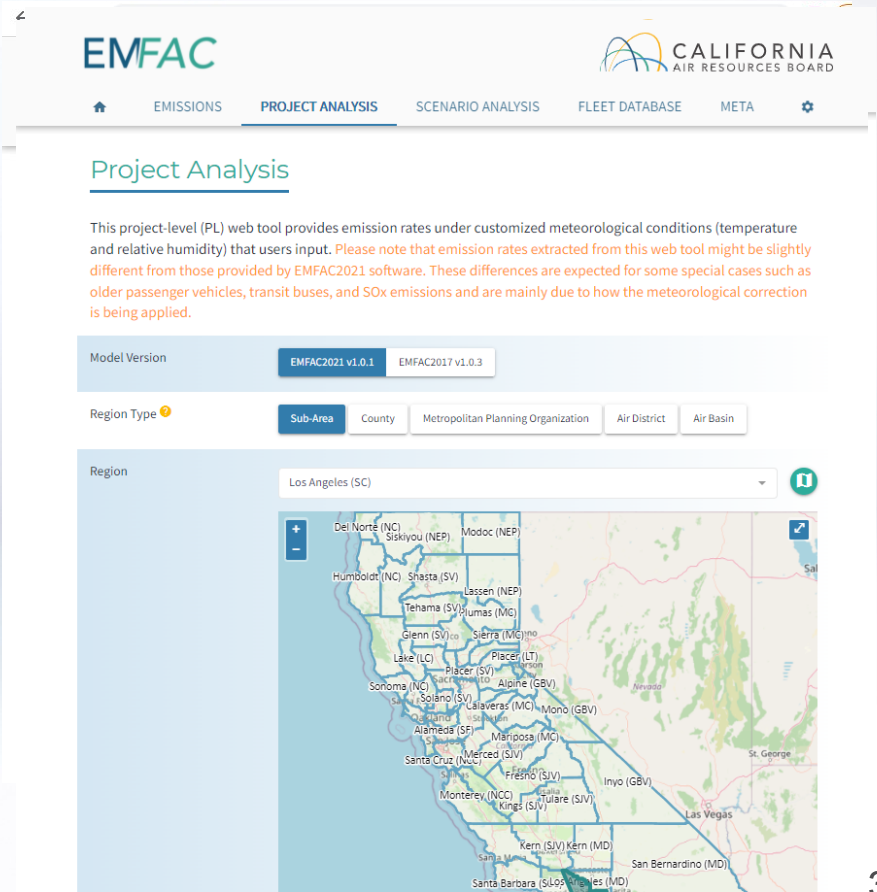
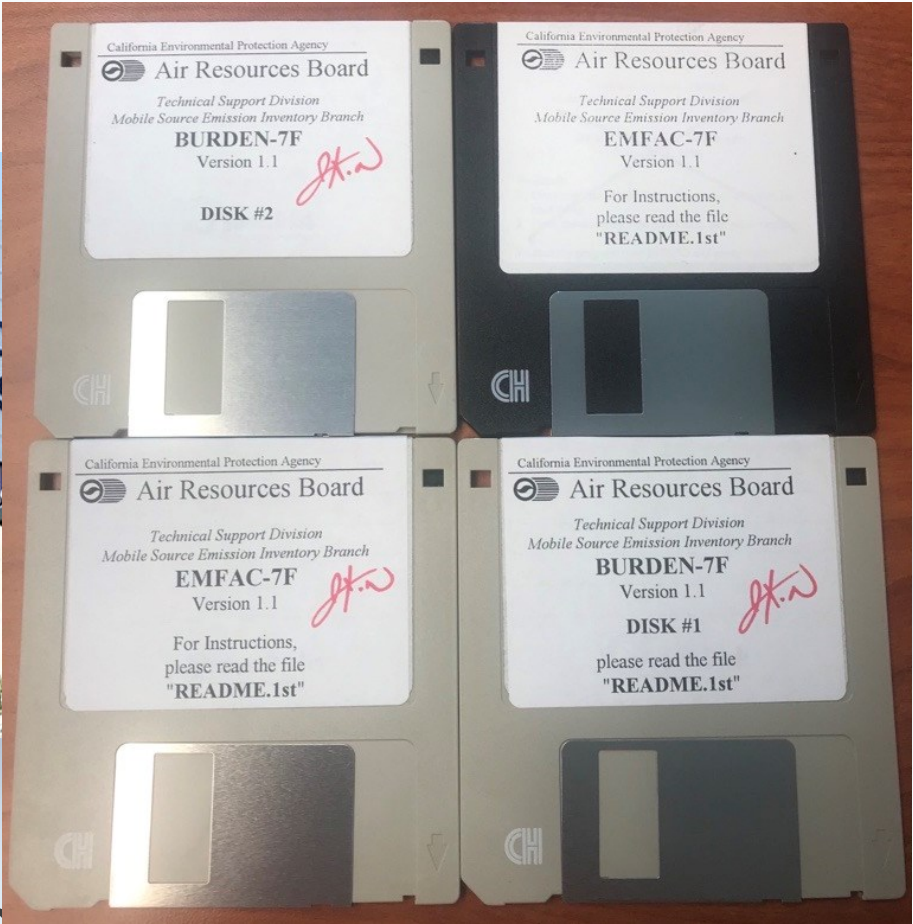


Regulatory Development

Decades of EMFAC Evolvement

from humble beginnings...

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



Traditional Data Sources for Vehicle Activities

Vehicle Population (by model year, age, fuel type, vehicle class)



Vehicle Registration Data



Other Data Sources
(e.g., data from Ports to identify port trucks)

Vehicle Miles Traveled (VMT) & Other Vehicle Activity Data (e.g., Speed Profiles)



Fuel Consumption
for Statewide VMT



Real-World Data
Logger Studies



Survey & Telematics & Smog Check Odometer Data



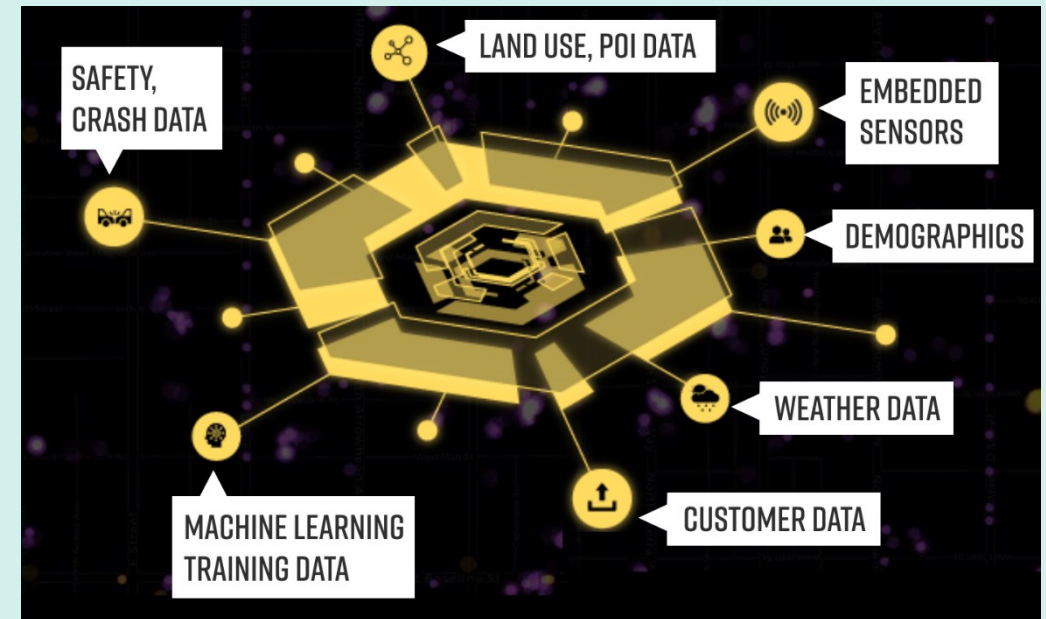
New Data Sources for Vehicle Activities

Vehicle Population



Roadside monitors
Automated License Plate Reader (ALPR)

VMT and other activity data



Big data in transportation:
Connected vehicles, GPS, and location-based
service (LBS) data

Goals

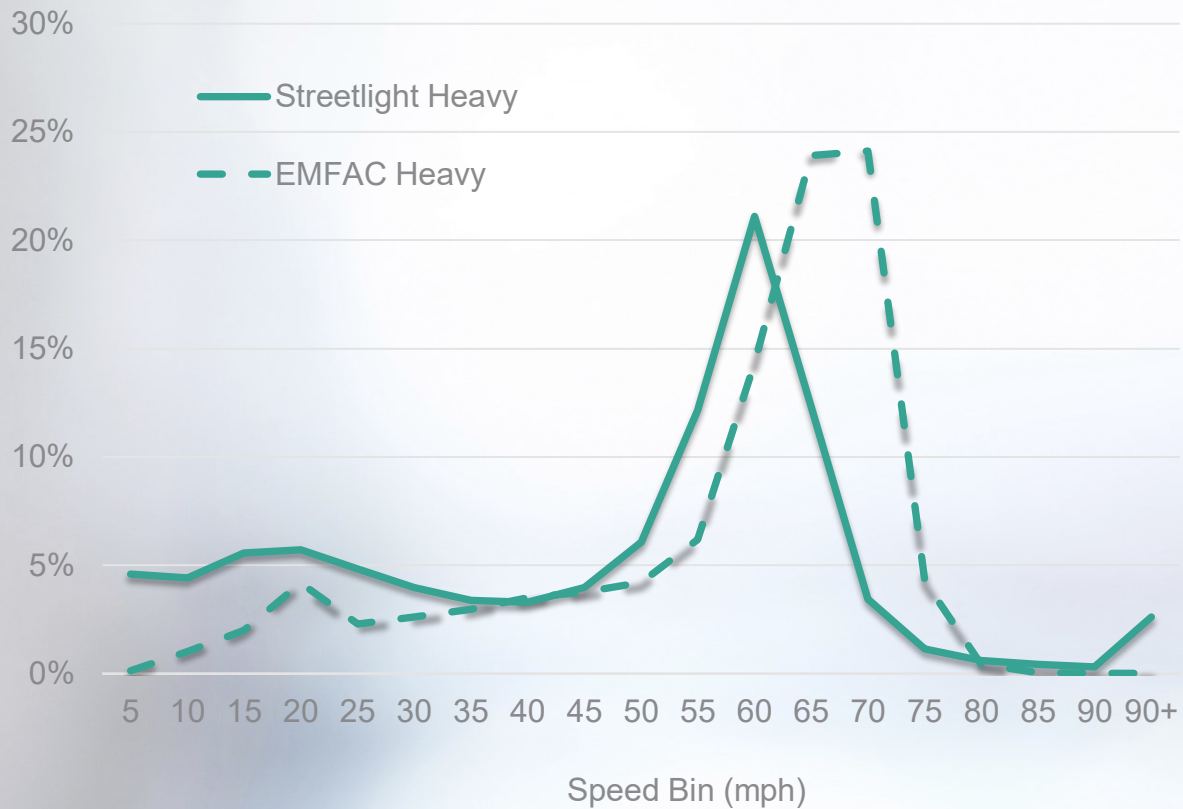
- Default EMFAC (county-level resolution):
 - Verify traditional data sources with big data
 - Update outdated data with recent data
- High-resolution emissions inventory
(Hosted on EMFAC web platform but separate from default EMFAC)
 - Increase the spatial resolution to census tract
 - Enhance data transparency and relevance to the public
 - Inform the development of community emission inventory and emissions reduction plans

Default EMFAC County-Level Activity Potential Improvements

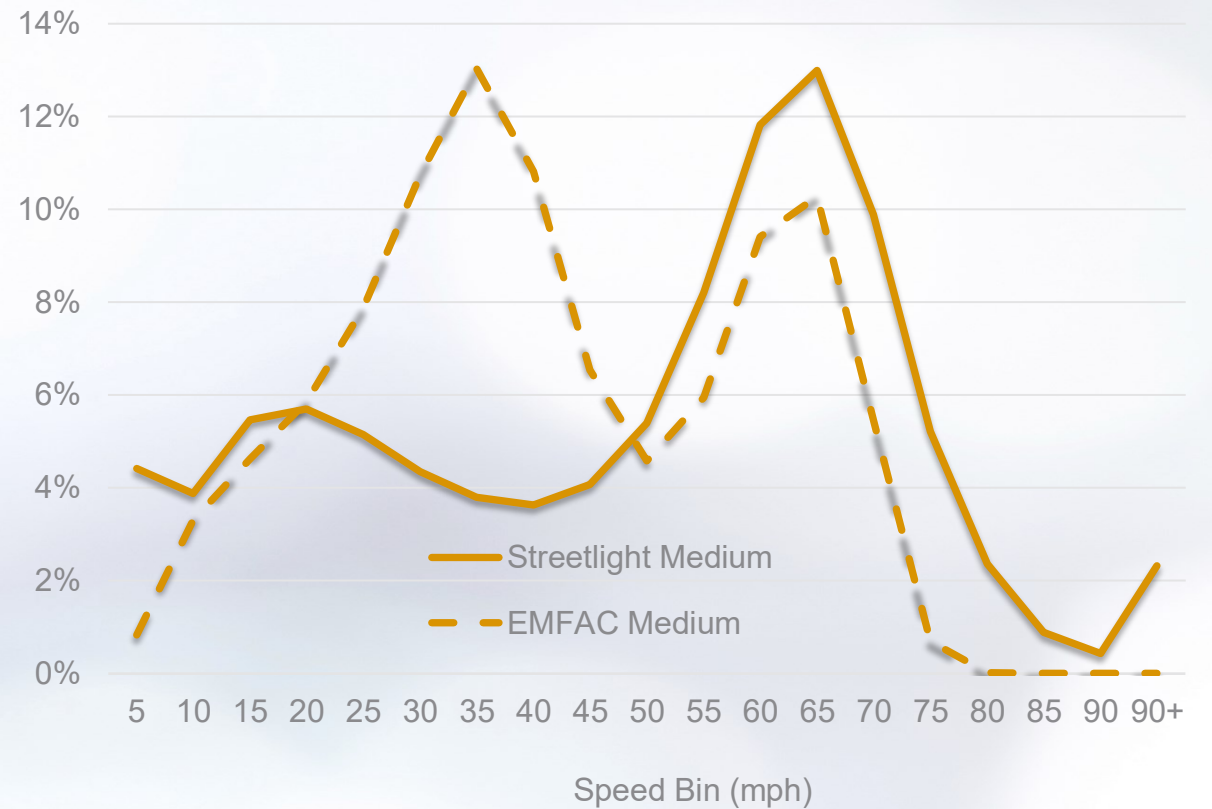
Variables	EMFAC2021	New data sources
Model year distribution	DMV and IRP	ALPR
Heavy heavy-duty VMT spatial distribution	Vehicle survey & California Motor Vehicle Stock, Travel, and Fuel Forecast (MVSTAFF)	Streetlight Monthly county-level VMT with truck classification
Light-duty VMT spatial distribution	California Vehicle Activity Database (CalVAD) tool developed by UC Irvine	Streetlight Monthly county-level VMT
Heavy-duty Vehicle speed profiles	Portable Activity Measurement System (PAMS) data	Streetlight

County-Level Sample data: StreetLight VMT by Speed Bin in San Diego

Heavy Heavy-Duty Trucks



Medium Heavy-Duty Trucks



Plan for Developing High-Resolution Emissions Inventory



Data Sources for High-Resolution Emissions Inventory



Routes of heavy-duty trucks (CY2019 - 2021)



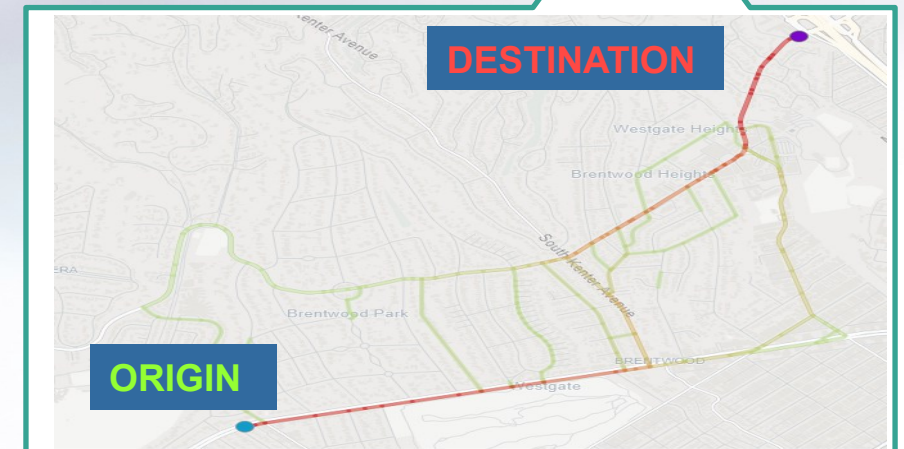
Geographic transit bus route data from public agencies

StreetLight High-Resolution Data (Under Development)

- StreetLight will provide origin-destination matrices and top routes for trucks
- CARB provided Streetlight origins and destinations of interest (warehouses, ports, etc)
- Vehicle vocation types may be identified based on origin/destination land use types

O-D MATRIX

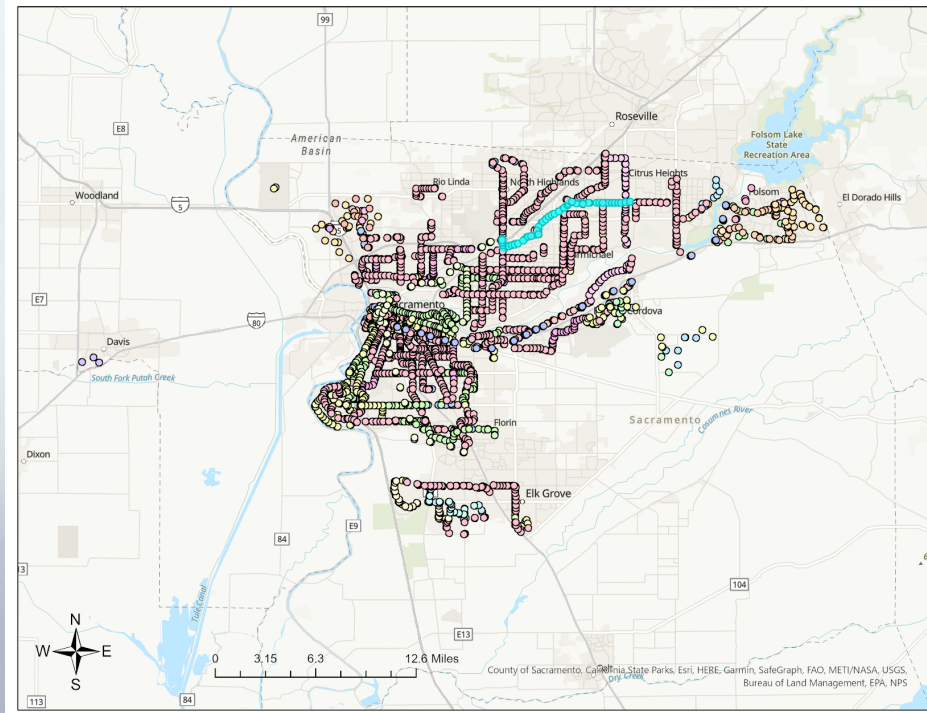
		DESTINATIONS			
		Zone 5	Zone 6	Zone 7	Zone 8
ORIGINS	Zone 1	0	143	3,027	166
	Zone 2	493	5	4,698	291
	Zone 3	2,711	24,672	213	18,905
	Zone 4	1,438	64	3,057	0



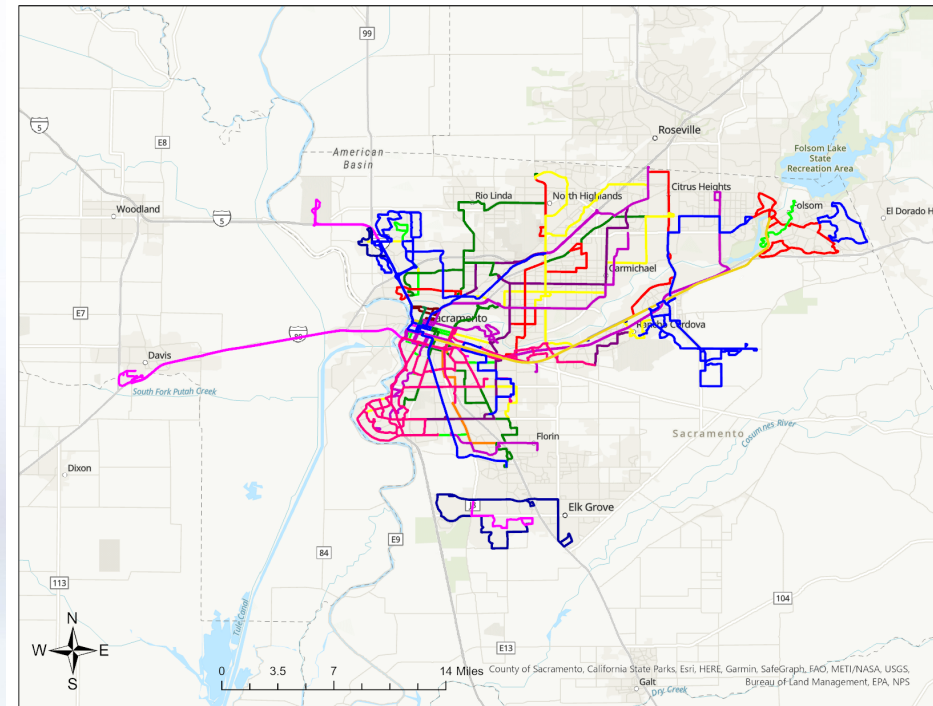
Transit Bus Analysis Demo

GTFS data for SacRT

All stops along routes



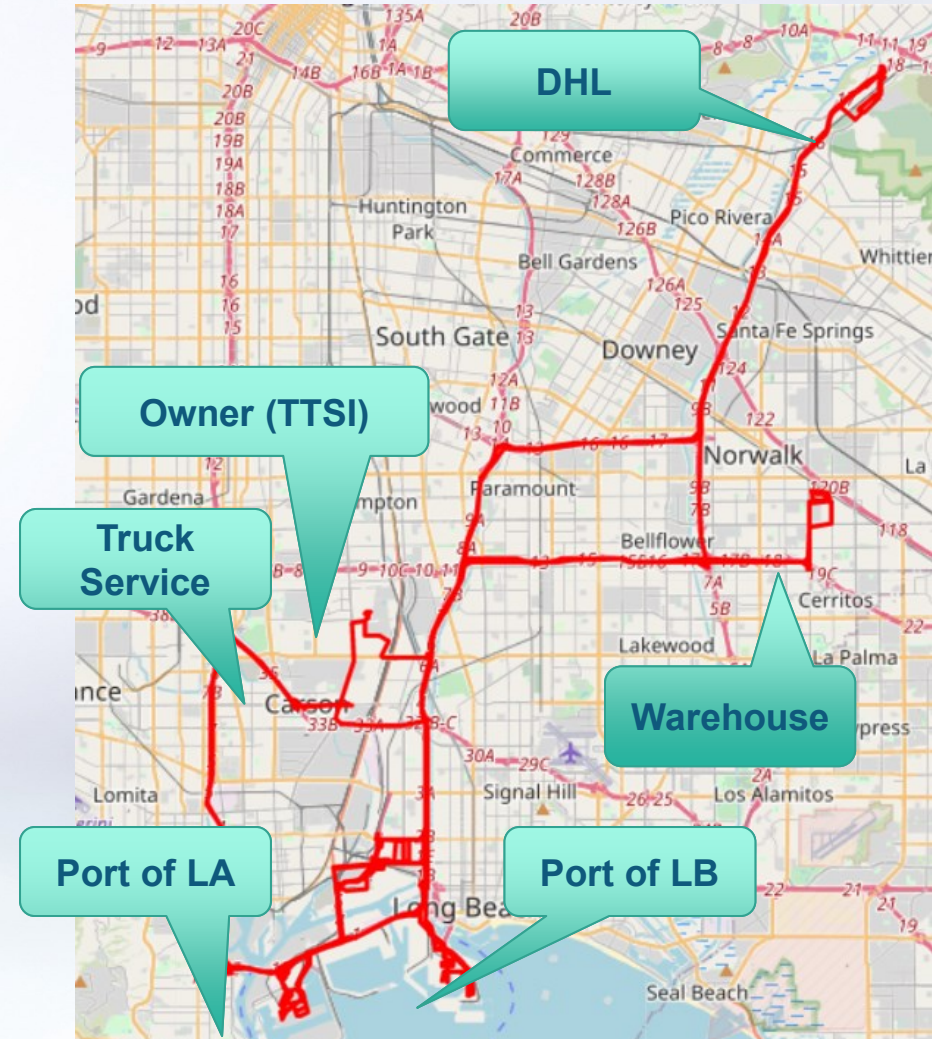
Bus routes



SacRT: Sacramento Regional Transit District
September 2021

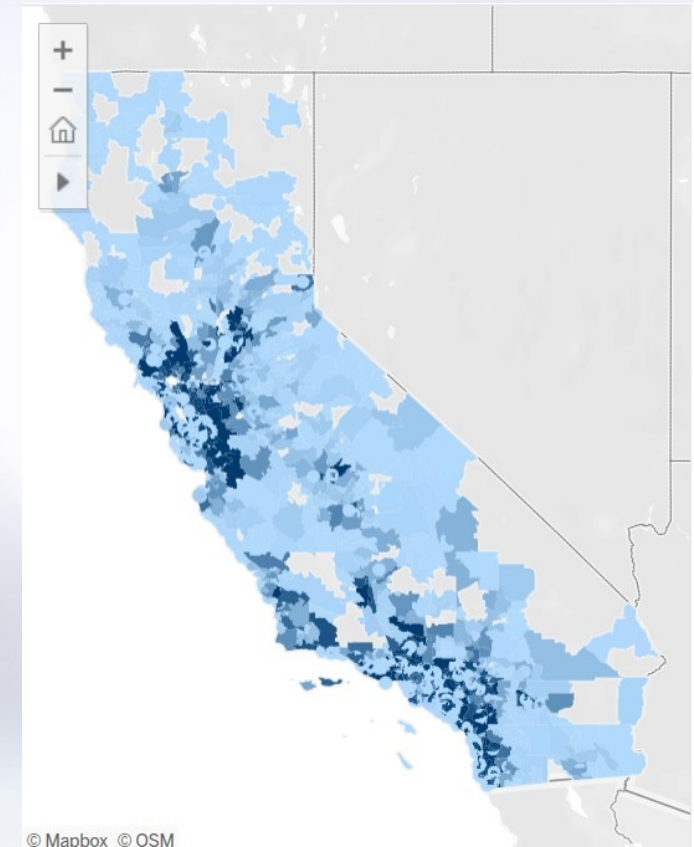
Forecasting Heavy-Duty ZEV Adoption Rate at High Resolution

- CARB's regulations will require ZEV adoption rates based on vocations
 - Innovative Clean Transit
 - Advanced Clean Fleets
- Default EMFAC: ZEV fraction projections vary by sub-area
- High resolution route data can inform the emission benefits of ZEV adoption by vehicle vocation and census tract



Forecasting Light-Duty ZEV Adoption Rate at High Resolution

- Statewide ZEV market share: new-sales-based compliance scenario of automakers under Advanced Clean Cars II
- ZEV adoption at census tract: contract with UC Berkeley to forecast variations



© Mapbox © OSM

Number of new ZEV sales by zip code

1 300

Source: California Energy Commission

Visualize Higher-Resolution Inventory on Web Platform (for Priority Regions)

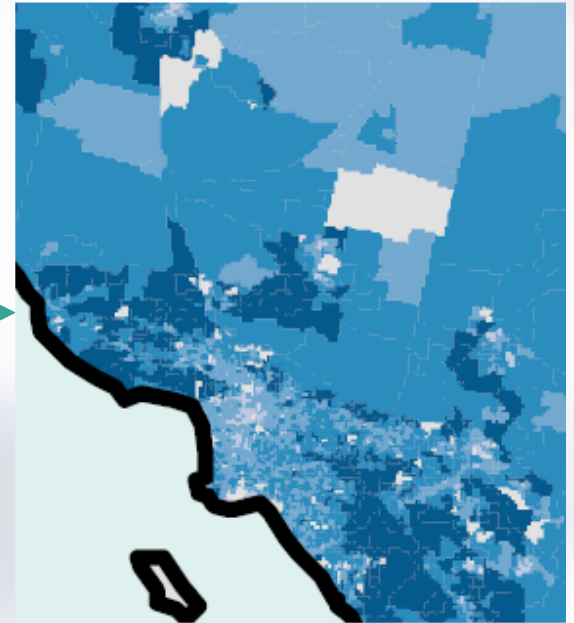
EMFAC



County to Census Tract Resolution

VMT Distribution in Census Tracts

High-Resolution Inventory



Plan to present heat map of VMT & emissions at census tract level

There is still a long way to go!

Immediate Next Steps

- Work with StreetLight to develop high-resolution route data for heavy-duty vehicles and validate the data using other sources (e.g., Metropolitan Planning Organizations and California State Travel Demand Model output)
- Disaggregate the VMT of transit agencies to census tracts

Thank You!

Contact Information

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