



NSF Engineering Research Center

Advancing Sustainability through Powered  
Infrastructure for Roadway Electrification



CERV 2023  
Seaports

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# Making the Biggest Impact

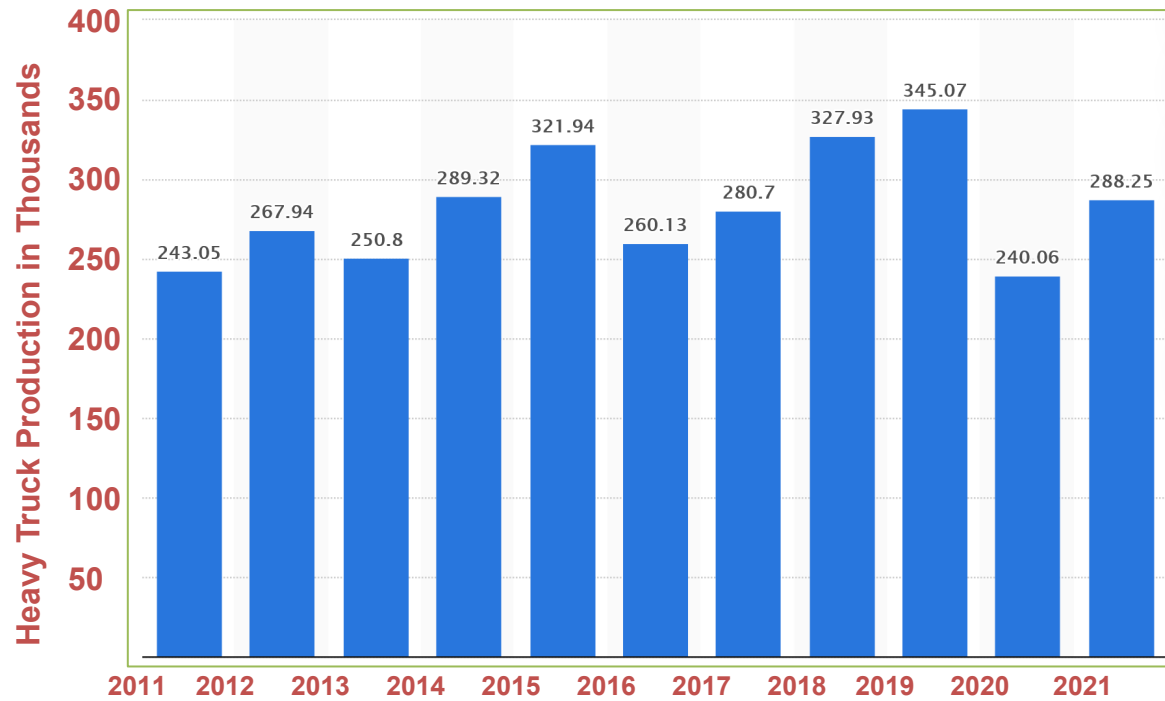
## Medium-Heavy Duty Vehicles



While making up only  
**10 percent**  
of all vehicles on the road,  
heavy-duty vehicles  
are responsible for a whopping  
**24 percent**  
of GHG emissions and  
**57 percent**  
of on-road, direct PM<sub>2.5</sub>  
emissions.

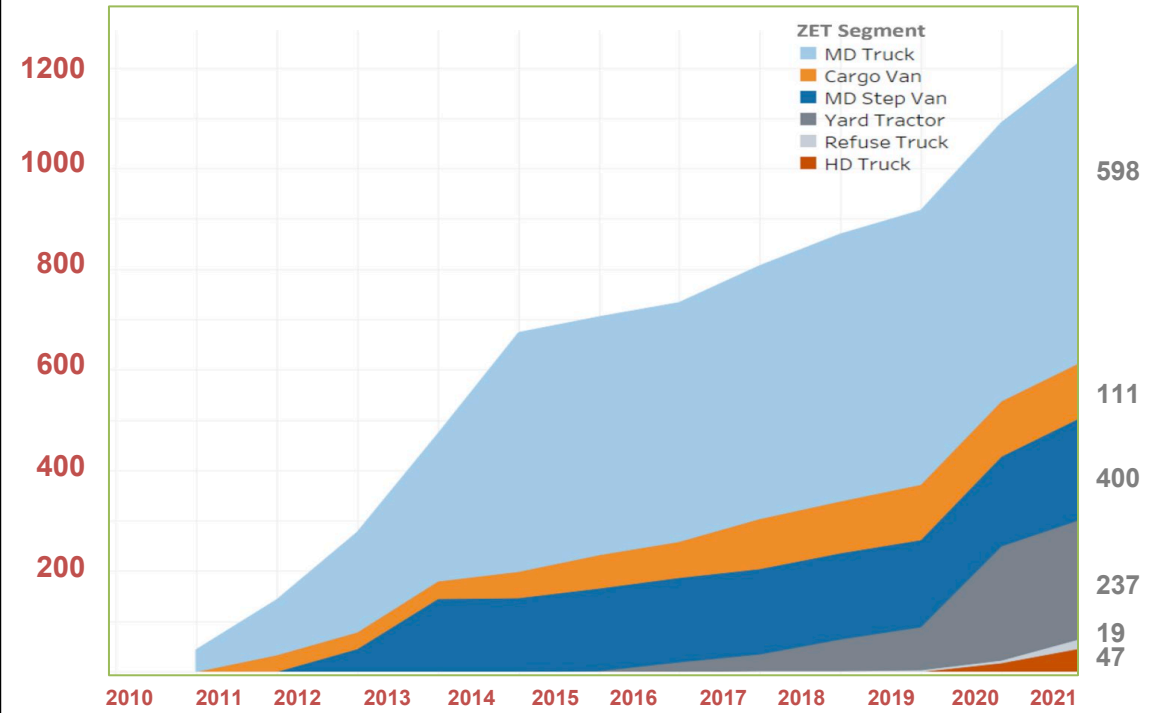
# Medium and Heavy-Duty EV Market Snapshot

## ALL Heavy Truck Production in USA 2011-2021



Statista 2022

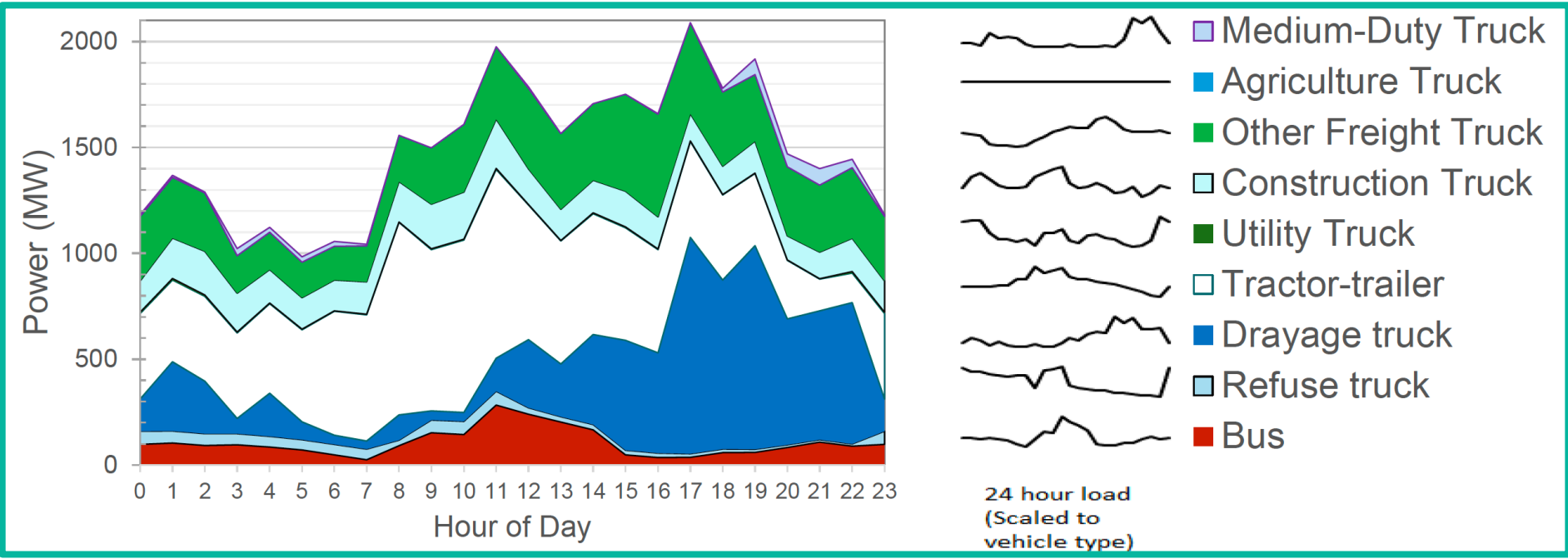
## ZE Truck Deployments by application (2010-2021)



CALSTART 2022

# What will it take from the grid?

Projected 2030 load curve for MDHD on-road vehicles across all segments.



California Energy Commission: 2<sup>nd</sup> Advisory Committee Meeting for the Clean Transportation Program



# Battery Electric Yard Trucks – 125kW WAVE Wireless Charger



## CHALLENGE:

- LA Ports largest fixed source of pollution, impacting local health
- Targeting ZE CHE by 2030 / ZE trucks by 2035
- Electrification difficult in already cramped, busy spaces
- Handling high-power cables

## OPPORTUNITY:

- At POLA Yard tractors = 32% of NOx and 43% of PM10

# Hyster-Yale Container Handlers | WAVE 250kW & 380kW



## WAVE 250 kW system

- First wireless charger installed at Port of LA



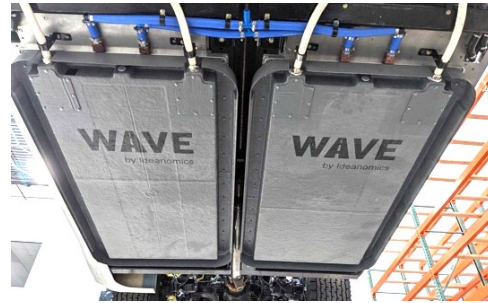
## WAVE 380 kW system

- HYG 52-ton container handler
- Maintains same duty cycle as diesel

# 500kW Wireless Charging | Port of Los Angeles



Largest Port Complex in US – Long Beach & Los Angeles



## WAVE 500 kW system

- Wireless Extreme Fast Charger
- 2 all-electric Class-8 drayage trucks
- DOE Funding



WXFC-Trucks:  
System Integration & Deployment  
500 kW



Wireless XFC System



MV Grid Connect



XFC Truck  
& Battery Pack