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2020 New Jersey Clean Air Council Public Hearing

Past, Present and Future: Air Quality Around Our Ports and Airports

Medium & Heavy-Duty Electrification
Preliminary Results Review

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Agenda

Review of *preliminary* results of ChargEVC's NJ Medium-Heavy Duty Study. Principle investigator for the Study commissioned by ChargEVC - Mark Warner, VP, Gabel Associates.

The Study results will help inform New Jersey strategy on where to focus resources that will make the most impactful differences with respect to emissions (human health impacting and climate impacting) and equity.

Final Study results are expected to be published in early September 2020.

<u>Presentation Agenda</u>

- Vehicle Categories
- What do we have in New Jersey: 2019 Snapshot
- Thought experiment to illustrate potential: Imagine 80% electrification in 2019
- Key findings (so far)
- Thoughts on goal setting

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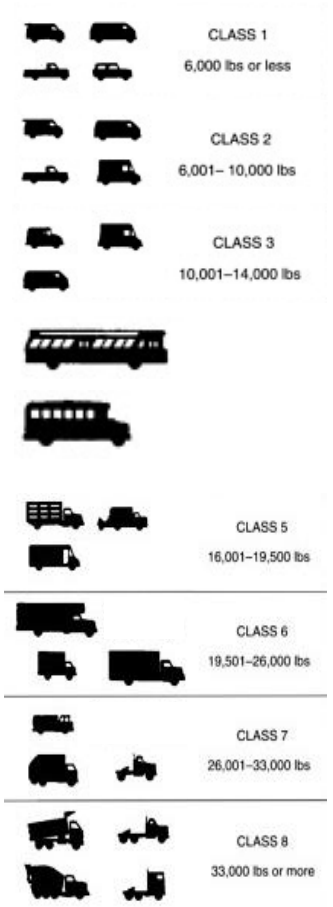
Vehicle Categories

2019 Vehicle Registration	MOVES: Source Type	FHA Vehicle Class
Light Duty Cars (Pop: 2,866,984)	21 Passenger Car	Class 1
Light Duty Trucks (< 8,501 lbs) (Pop: 3,469,170)	31 Passenger Truck	Class 2
	32 Light Commercial Truck	~ Class 2 ~ Class 3
Medium Duty Trucks (8,501 – 14,000 lbs) (Pop: 37,758)	41 & 42 Intercity & Transit Bus	Class 7 (Transit bus only)
	43 School Bus	Class 6 (school bus only)
Non-School Bus (Pop: 7,053)	51 Refuse Truck	Class 4 Class 5 Class 6 Class 7 Class 8 > 14,000 Pounds
School Bus (Pop: 15,739)	52 Single-Unit: Short Haul	
	53 Single-Unit: Long Haul	
Heavy Duty Trucks (> 14,000 lbs) (Pop: 329,355)	54 Motor Home	
	61 Combo: Short-Haul	
	62 Combo: Long-Haul	



Light Duty Trucks Are Mostly Passenger Vehicles: SUVs, Cross-Overs, Mini-Vans, Pick-Ups

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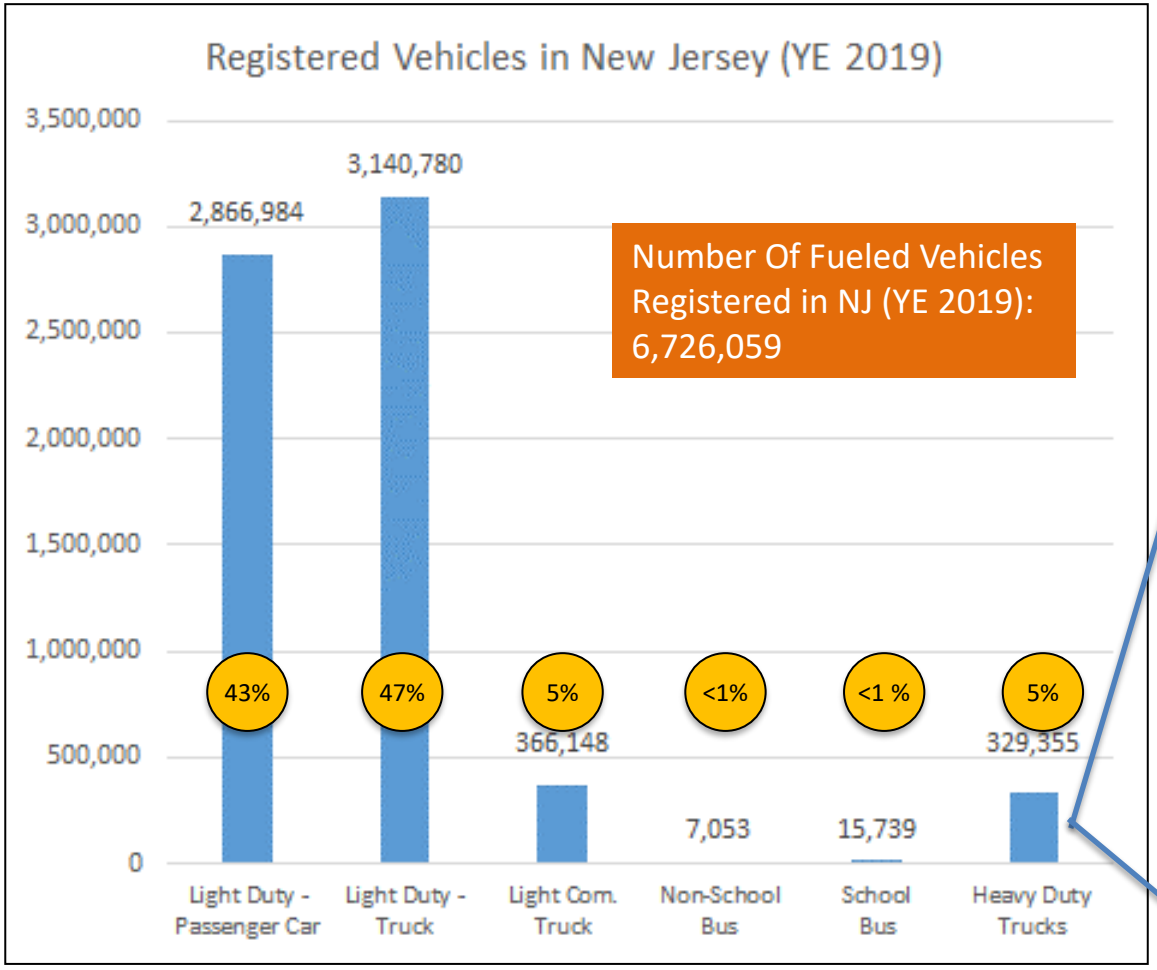
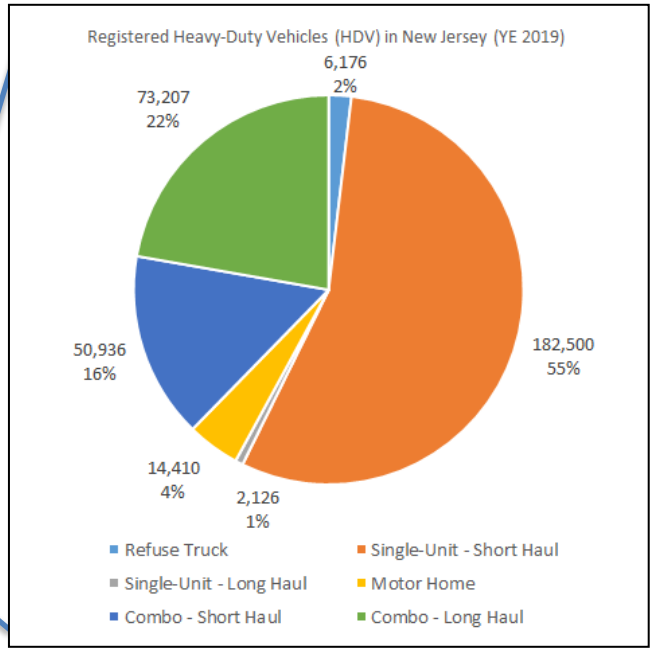
2019 Snapshot: Vehicles





Note: of the ~7K non-school buses, ~2,500 are NJ Transit.;

Based on vehicle registration data from DEP as of YE19, mapped to source type based on prior distributions.

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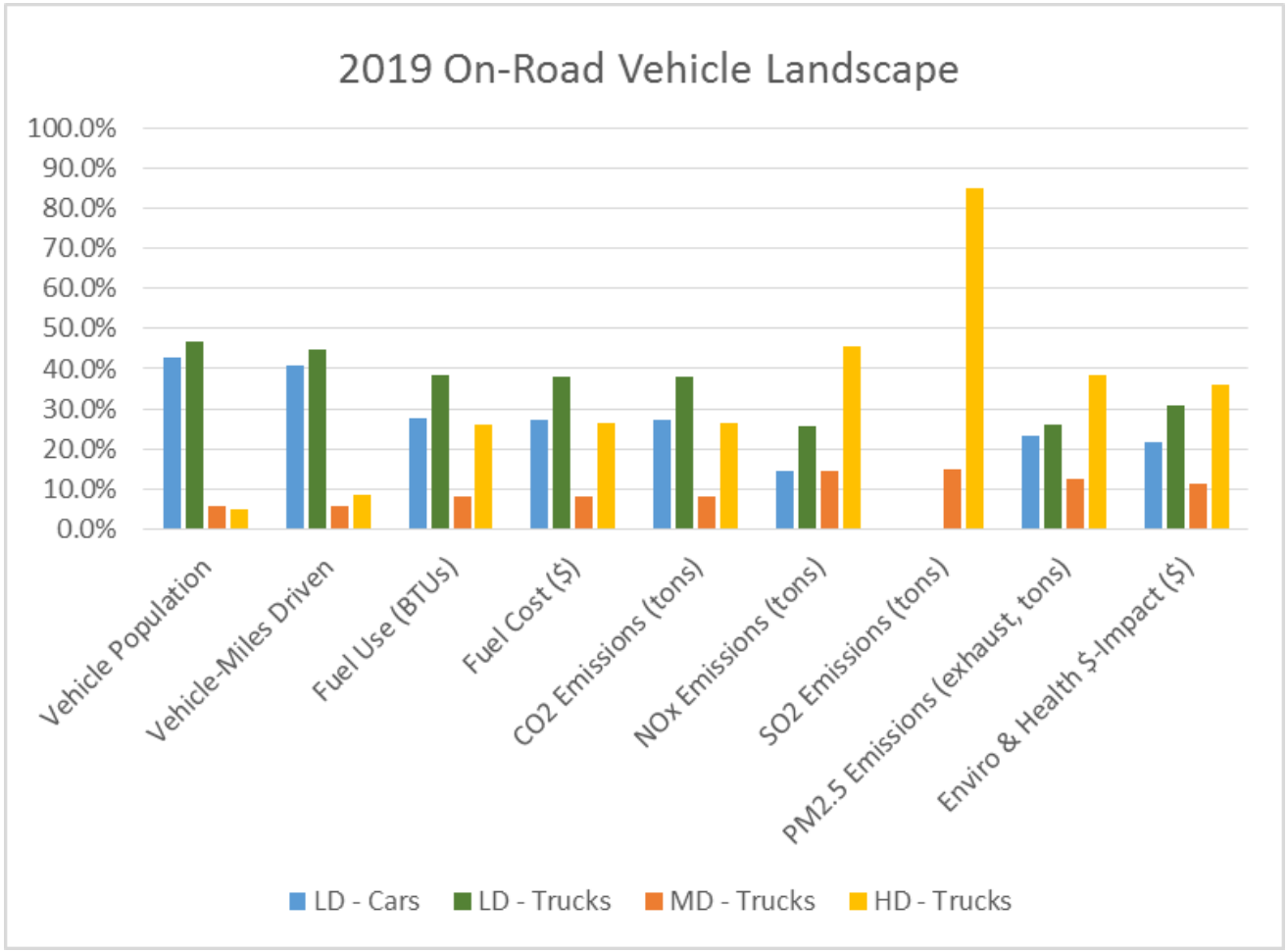
2019 Snapshot: Summary



Note: Calculation of environmental economic impact considers not just how the quantity of emissions changes, but how the location of emission changes.

Key Findings:

Light-Duty Vehicles Represent The Majority Of:

- Vehicle Count
- Miles Driven
- Fuel Use & Costs
- CO2 Emissions

M/H-Duty Vehicles Represent The Majority Of:

- NOx, SO2 and PM2.5 Emissions
- Env-$-Impact

LDVs Are Motivated By CO2 & Fuel Cost Savings;
M/H-duty Vehicles Best Prioritized For Public Health Impacts.

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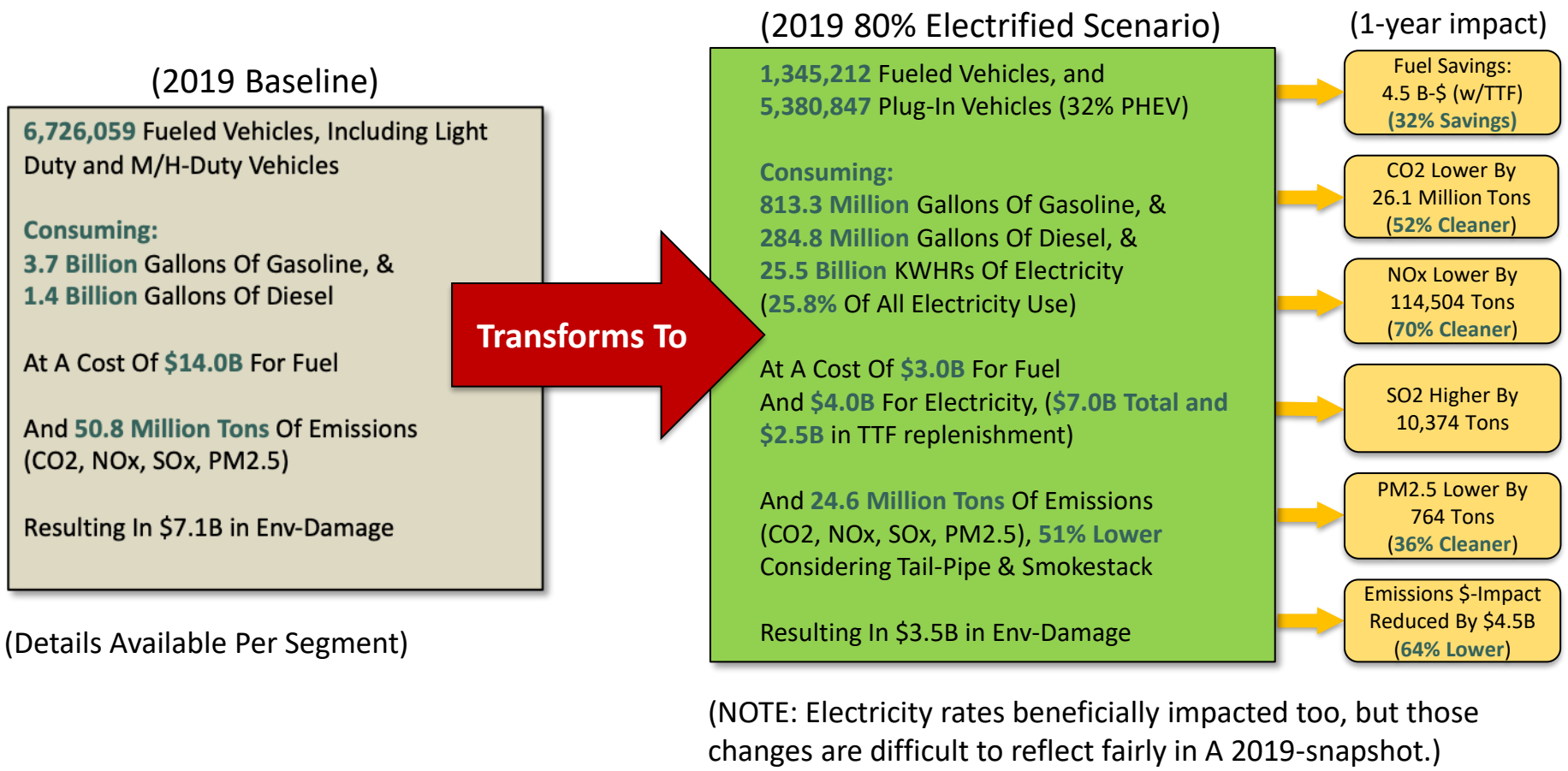
Electrification Potential (80% - 2019)

Thought Experiment: 2019 partially electrified (80% of Vehicles, 76% of Miles):



(Details Available Per Segment)

(NOTE: Electricity rates beneficially impacted too, but those changes are difficult to reflect fairly in A 2019-snapshot.)

- Note: small number (<1%) of plug-in vehicles in 2019 baseline not considered in this high-level comparison
- Note: Electrification assumes ALL BEVs in all M/H-Duty segments
- Note: Emission factors reflect PJM-wide supply mix (not just NJ), and will go down as RE-fraction increases (especially SO2)

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Key Findings – So Far

- While LDV account for majority of vehicles, miles and fuel use, buses and other MHDV have a disproportionately large impact on emission (especially NOx (59%), and PM2.5 (51%)) and public health.
- Impacts are strong near MHDV travel concentrations.
- LDV electrification best prioritized for fuel/operational savings and CO2 reductions; Diesel displacement Is best prioritized as a public health initiative.
- Diesel segments are extremely diverse, differ regarding electrification readiness, potential transition schedule, infrastructure requirements, relative impact. Electrification readiness and feasibility much higher in some segments than others.
- Analysis, prioritization, and goal-setting must be done at the segment level.
- Charging infrastructure requirements and potential grid impacts may be critical factors (on readiness, feasibility, and costs) in some segments.
- LDVs impacts grid through large numbers of small loads; MHDV impacts grid through a relatively small number of large loads at relatively few locations.
- Opportunities for MHD charge optimization: storage, smart scheduling, in-route charging. These strategies are a change from business as usual.
- There are multiple possible paths for electrifying key segments.

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Goal Setting

- Goal Setting Would Benefit From Four Stages:
  - Baseline characterization (PER SEGMENT)
  - Electrification schedule planning (PER SEGMENT, see below)
  - Electrification pathway planning (PER SEGMENT)
  - Segment and pathway prioritization

- Electrification Schedule Depends On Several Factors:
  - Vehicle readiness
  - Natural retirement rate
  - Market adoption rate (once readiness achieved)
  - Other gating factors, especially infrastructure availability
  - These factors can be combined into an aggregate “percent of new sales per year” adoption profile

- Some Segments Are MUCH More Mature Than Others, Incentive Needs Vary Widely

- There May Be “Sub-segments” Within The Traditional Vehicle Groupings

- Goal Setting May Also Be Influenced By Strategic Factors (equity, public health priorities)