EV Particulate Matter Emissions in Transportation Conformity

Center for Advancing Research in Transportation Emissions, Energy and Health (CARTEEH)

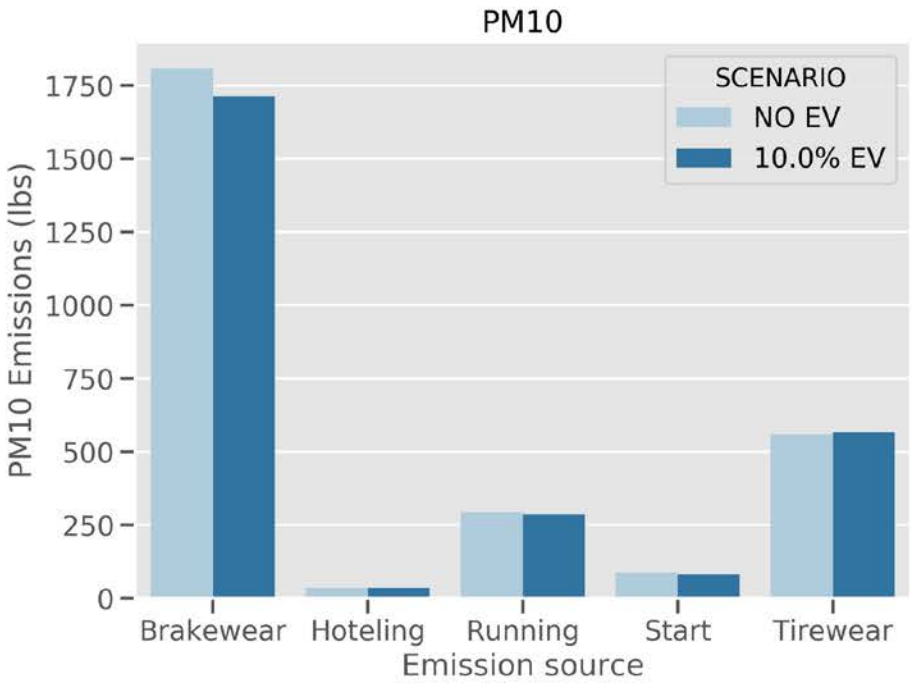
Xiaodan Xu, Tara Ramani, Andrew Birt, Marty Boardman, **Yanzhi "Ann" Xu**, Joe Zietsman

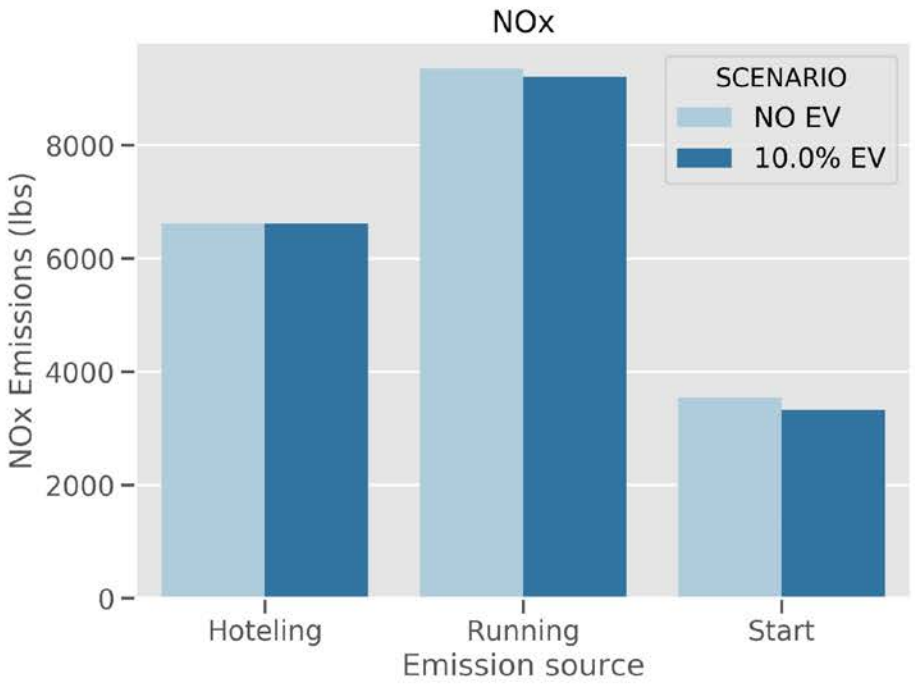
January 5, 2021

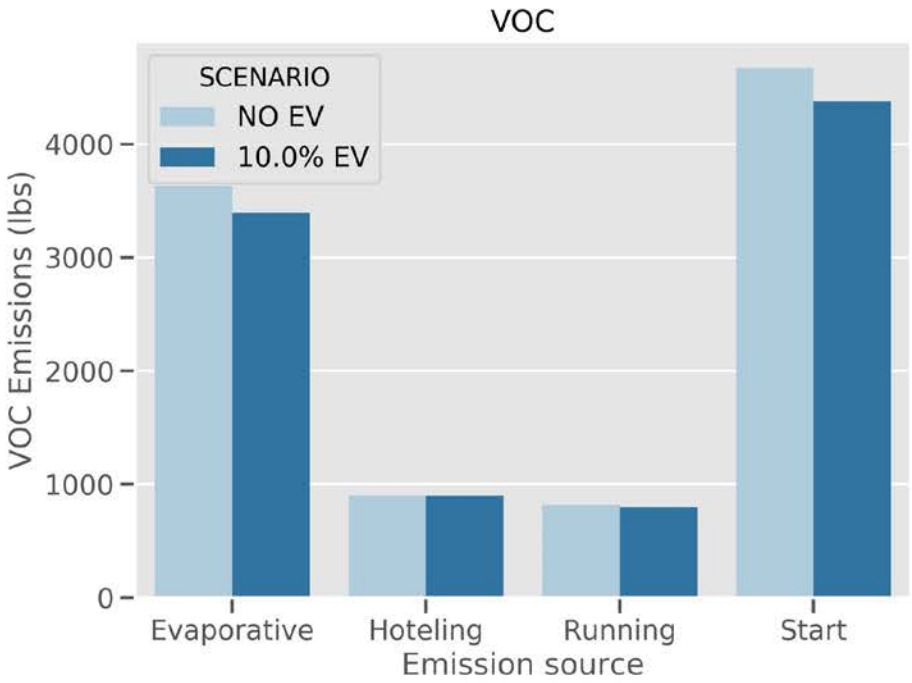
Texas A&M Transportation Institute

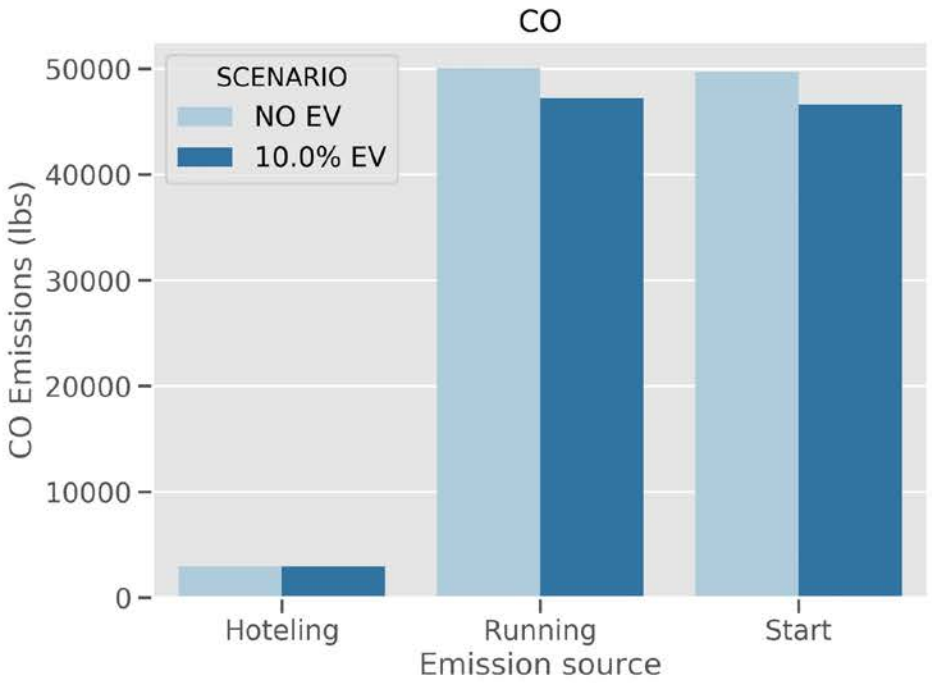
Qualitative Analysis

Emission process	Component	Impacted by EVs?	Direction of change	Emission adjustment
Running	Running exhaust + crankcase running exhaust	Yes	Zero pollutants	Only include emissions from non-BEV part of fleet
Brake wear	Brake wear	Yes	Zero PM_{10}	Only include emissions from non-BEV part of fleet
Tire wear	Tire wear	Yes	Increased PM_{10}	Scale up BEV portion with adjustment factors from previous study (12)
Start	Start exhaust + crankcase start exhaust	Yes	Zero pollutants	Only include emissions from non-BEV part of fleet
Evaporative - parking	Permeation, fuel leak, tank vapor venting	Yes	Zero pollutants	Only include emissions from non-BEV part of fleet
Evaporative - operation	Permeation, fuel leak, tank vapor venting	Yes	Zero pollutants	Only include emissions from non-BEV part of fleet
Hoteling	Extended idling emission, auxiliary power unit (APU) emission, crankcase extended idling emission	No	N/A	No adjustment
Resuspension	Resuspension emission	Yes	Increased PM_{10}	Adjust vehicle weight distribution to reflect heavier BEVs









Emissions from Direct Vehicle Use (MOVES)

El Paso, TX Case Study

PM Results – El Paso, TX Case Study

Scenario	VMT	Speed (mph)	PM_{10} from Direct Vehicle Use (US ton)	PM_{10} Resuspension (US ton) (95% CI estimation provided in parenthesis)
Baseline (No EV)	22,708,612	35.17	1.39	6.49 (3.1– 15.0)
10% Passenger Cars as EVs	22,708,612	35.17	1.34	6.58 (3.1 – 15.2)
Absolute Difference	0	0	**-0.05**	**0.11**
Relative Difference	0%	0%	**-3.7%**	**1.4%**
Statistically Significant?	NA	NA	**Don't know**	**No**

Observations

- Using MOVES and published assumptions, PM emissions from direct vehicle use appear to slightly decrease from light-duty vehicle electrification
- Calculations based on AP-42 for road dust, which is required for PM non-attainment areas, exhibit large uncertainties.
  - Point estimate of road dust emissions increase due to weight increase
  - But the change does not appear to be statistically significant

CARTEEH