

For NASEM Workshop



EV CONSUMER NEEDS PANEL SESSION



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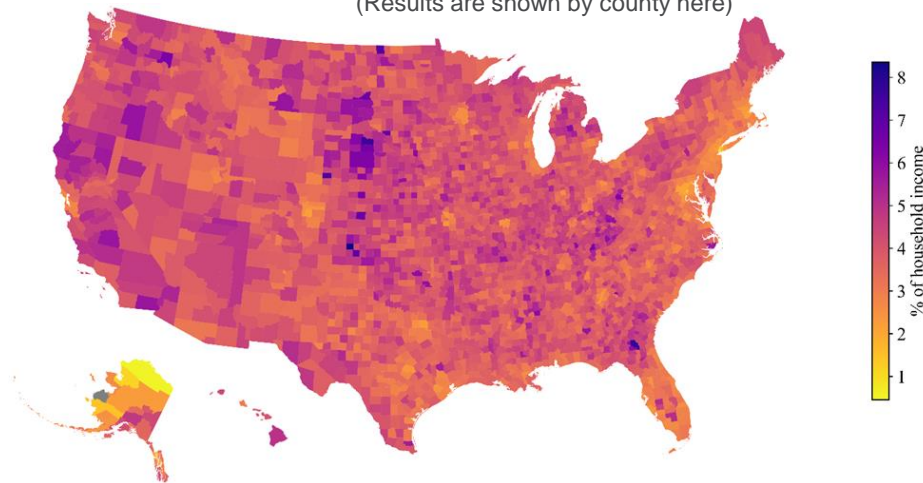
October 28, 2021

Household In Certain Areas Spend Up To 20% Of Their Income Today On Transportation Energy

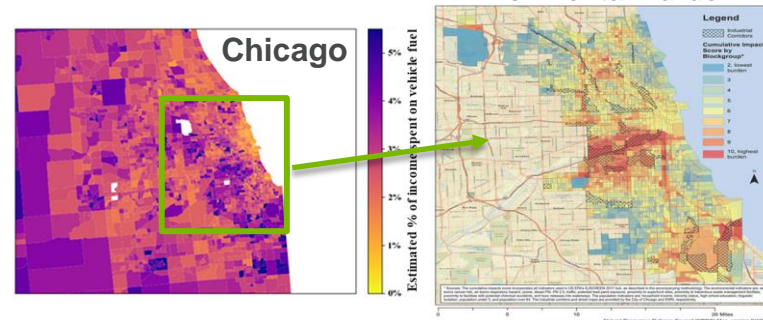
Increase adoption of fuel-efficient vehicles, especially among low-income households, could improve energy equity

Transportation Energy Burden by Census Tract

(Results are shown by county here)



Environmental Burden



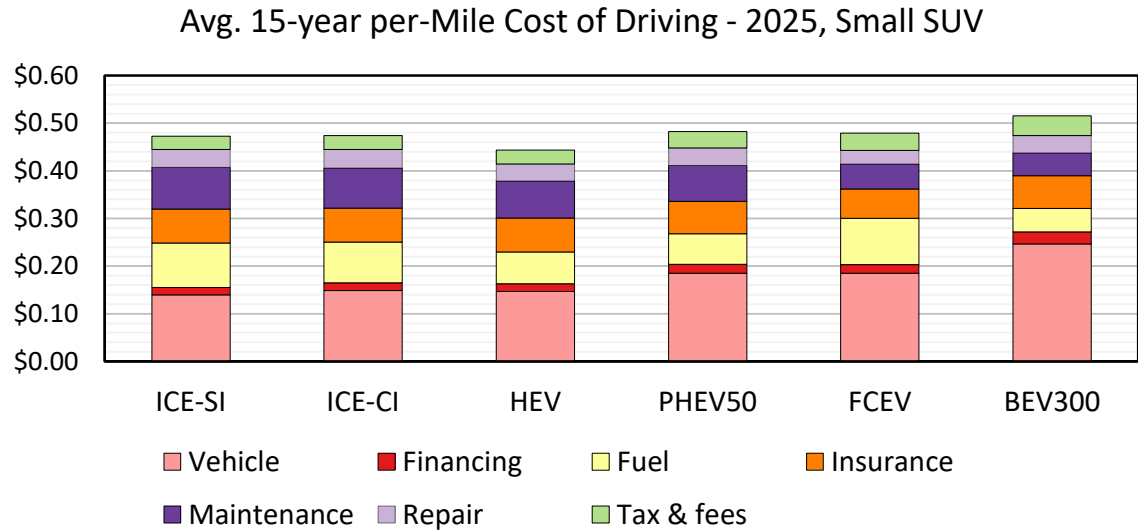
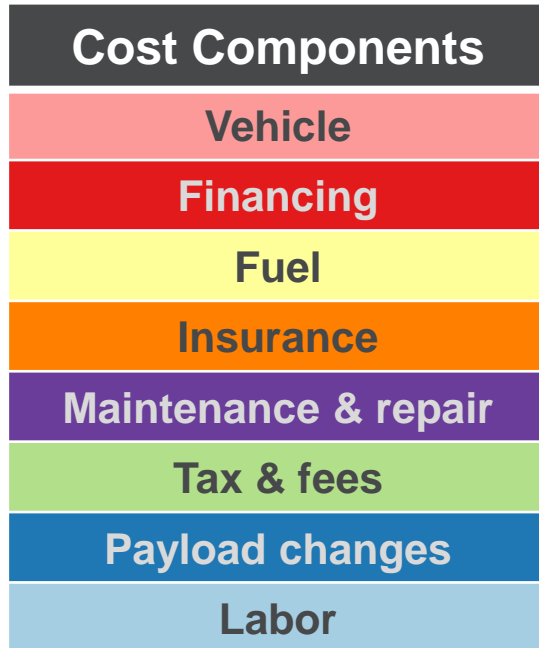
Source: NRDC

$$\text{Transportation energy burden} = \frac{\text{Cost}}{\text{Income}} = \frac{\frac{\text{Vehicle Efficiency}}{\text{mile}} \times \frac{\text{Fuel Price}}{\text{gallon}} \times \frac{\text{Household annual miles}}{\text{household}}}{\$ \text{ year} \cdot \text{household}}$$

<https://doi.org/10.2172/1760477>

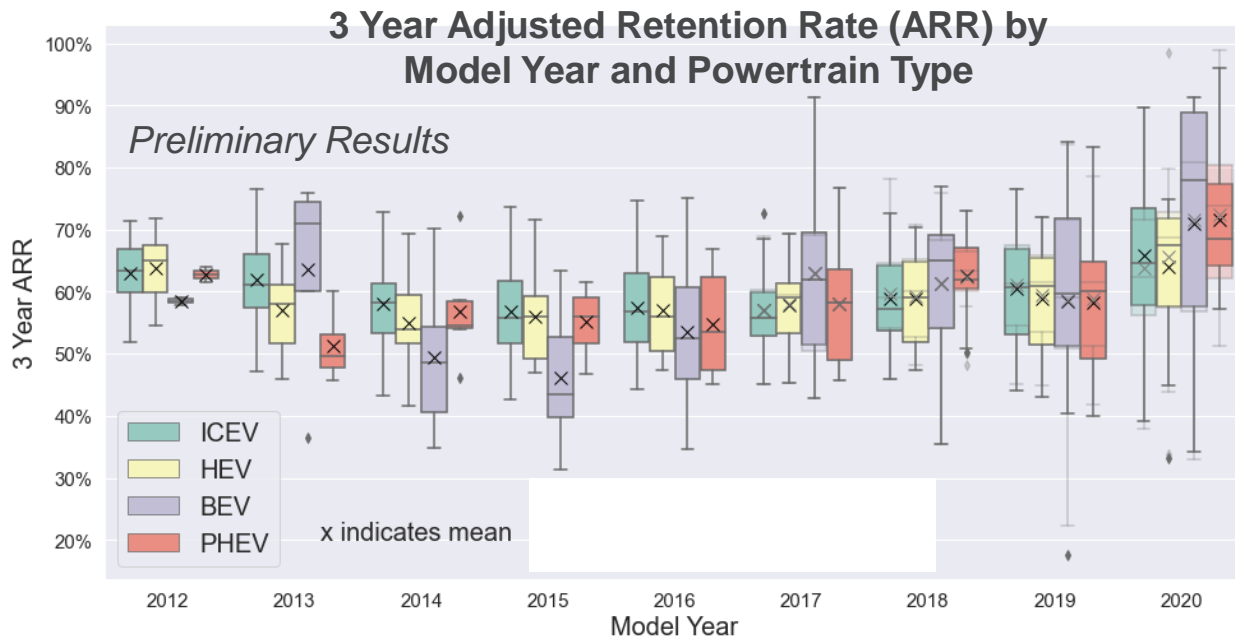
Comprehensive Vehicle Total Cost of Ownership Framework to Compare Different Vehicle Powertrain

- 8 important cost components for quantifying levelized cost (\$/mil) for light-duty and heavy vehicles, and compare different vehicle powertrain in an internally consistent way
- Vehicle cost includes purchase and depreciation



Plug-in Electric Vehicles Increasingly Retain Value, Better Than ICEVs And HEVs In Recent Model Years

- Plug-in electric vehicle depreciation shows a broad range across brands
- Mature powertrain technologies (ICEV and HEV) have more consistent 3-year ARR over time
- MY19/20 are estimated values using an exponential function

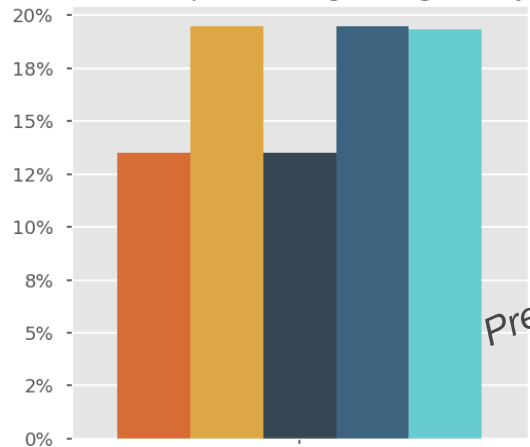


$$\text{Adjusted retention rate at year } i \text{ (ARR}_i\text{)} = \frac{\text{True Market Values (TMV)}}{\text{MSRP (new)} - \text{Federal Incentive}}$$

Spreading Chargers More Widely Improves Charging Success at Public Locations

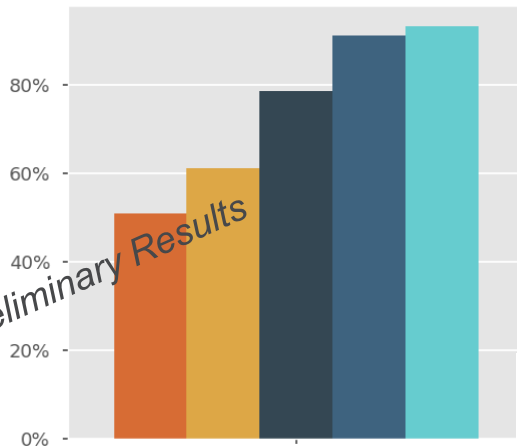
Even with 20% home charging availability (heavy reliance on public charging), >90% of drivers can charge on their first attempt

Percent of drivers who attempted to charge on a given day



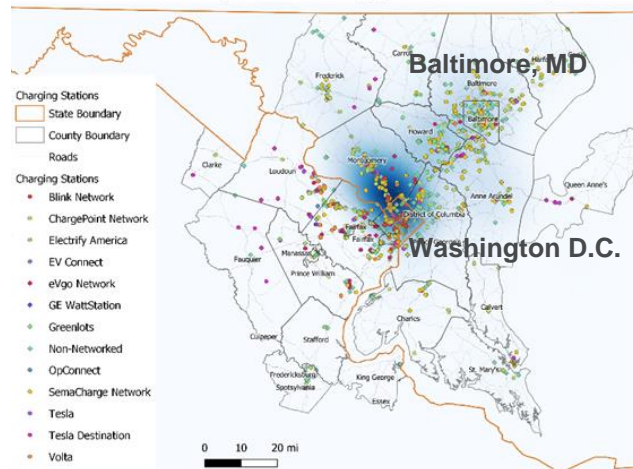
Simulation Year 2030

Percent of first attempts that were successful



Preliminary Results

Density of BEVs and Charging Infrastructure in Study Area



Source: AFDC (summarized in September 2020)

