Geographic Variation of US Residential Charging Potential for Electric Vehicles

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We estimate future opportunities for US residential charging infrastructure as a potential barrier to adoption of plug-in vehicles.

Approach

- We estimate access to dedicated residential parking where charging could potentially be installed
- We report results per personal vehicle, not per household, taking multivehicle households into account
- We combine data from the 2013 American Housing Survey and the 2015 Residential Energy Consumption Survey to find a representative sample of household data including number of vehicles and number of off-street parking spaces
- To account for uncertain factors, we define an optimistic case, a base case, and a pessimistic case

Table 1: Major assumptions and sensitivity analysis cases.

Base Case	Optimistic Case	Pessimistic Case
• 10% of spaces are unavailable for parking (used for living space, storage, etc.) • Each home has only 1 type of parking: either a garage/carport or other off-street parking	• All spaces available for parking • Homes with a garage/carport may also have other off-street parking (e.g. driveway, lot)	• 50% of spaces are unavailable for parking (used for living space, storage, etc.) • Each home has only 1 type of parking

Findings

- 67% of US personal vehicles have dedicated parking nationally in the base case scenario
- Pessimistic and optimistic cases find that 41% to 86% of US personal vehicles have dedicated parking nationally
- Percentage of personal vehicles with dedicated parking varies slightly by census division but varies from 35% to 100% in base case across different SMSAs and as low as 23% in the pessimistic case

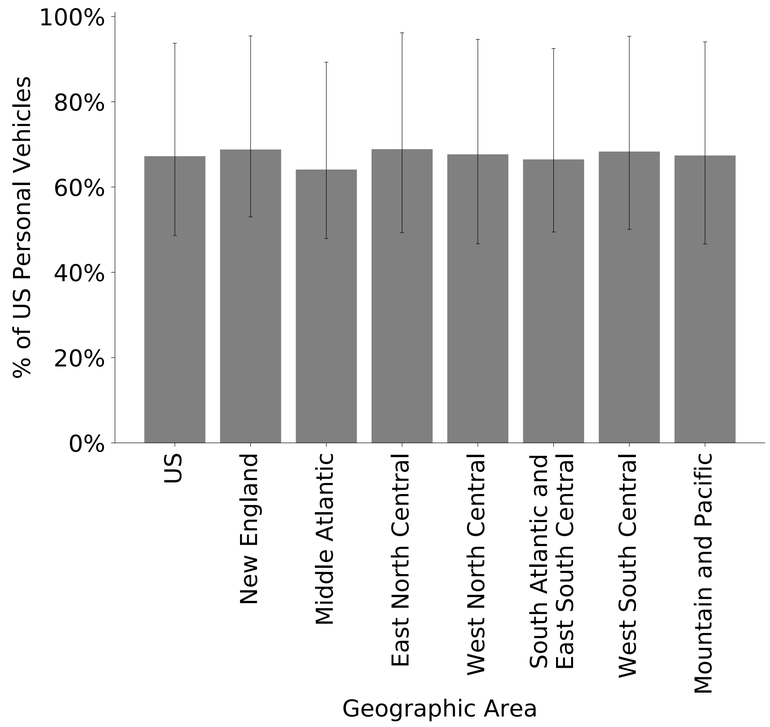

Figure 2: Comparison of percentage of US vehicles with dedicated residential parking nationally and across census divisions. Error bars indicate range of optimistic and pessimistic scenarios.

Implications

- Achieving a plug-in vehicle adoption rate higher than 67% nationally (or 35% to 100% in an SMSA) may require significant changes in:
  - residential parking infrastructure, which changes slowly, or
  - the dominant mode of vehicle charging (e.g. significantly faster and more convenient public charging) or
  - vehicle ownership patterns (e.g. a move away from personal vehicle ownership)
- Planning for plug-in vehicle adoption and public vehicle charging infrastructure should consider that residential charging potential may be lower than the ~80% of vehicles that is often assumed and varies geographically

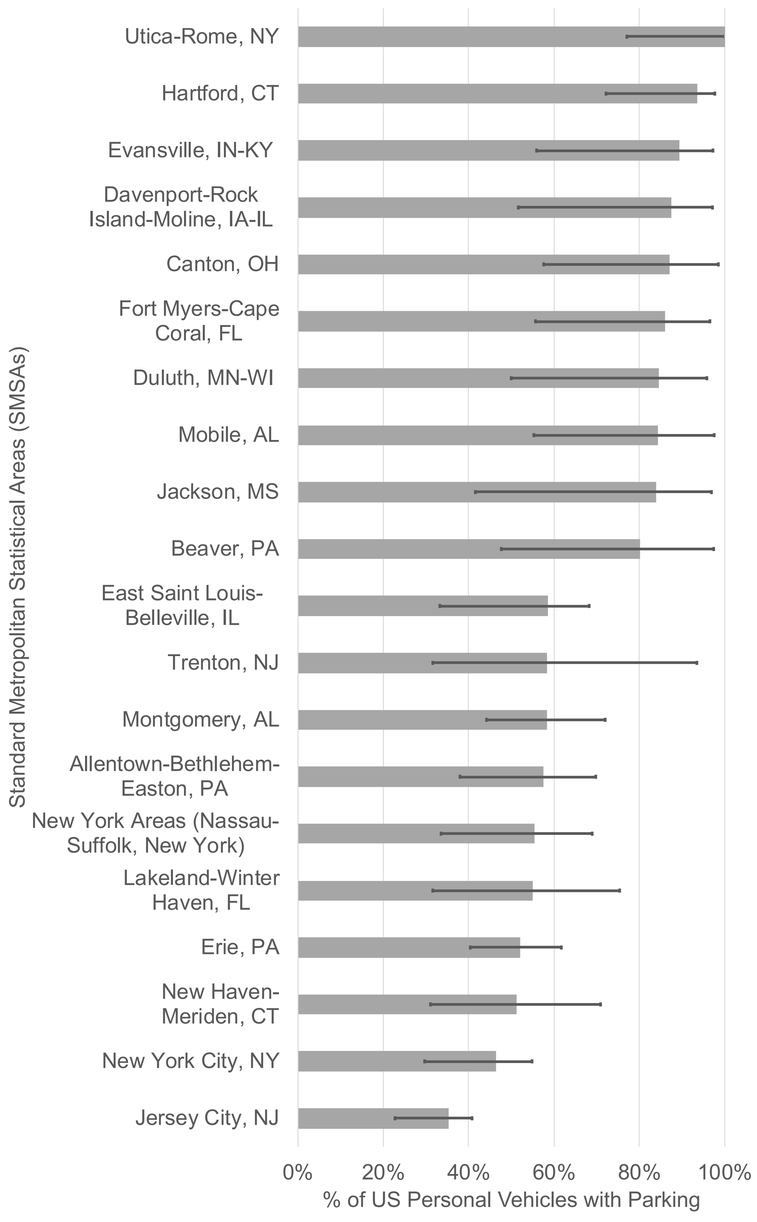

Figure 3. Top 10 and bottom 10 Standard Metropolitan Statistical Areas (SMSAs) for vehicles with dedicated residential parking. Error bars indicate range of optimistic and pessimistic scenarios.