UCDAVIS
PLUG-IN HYBRID & ELECTRIC VEHICLE RESEARCH CENTER
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# Social, Technological, and Economic Barriers to Heavy-Duty Truck Electrification

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# Research Questions

Fleets purchase thousands of vehicles every year, but their purchase decisions are largely unknown

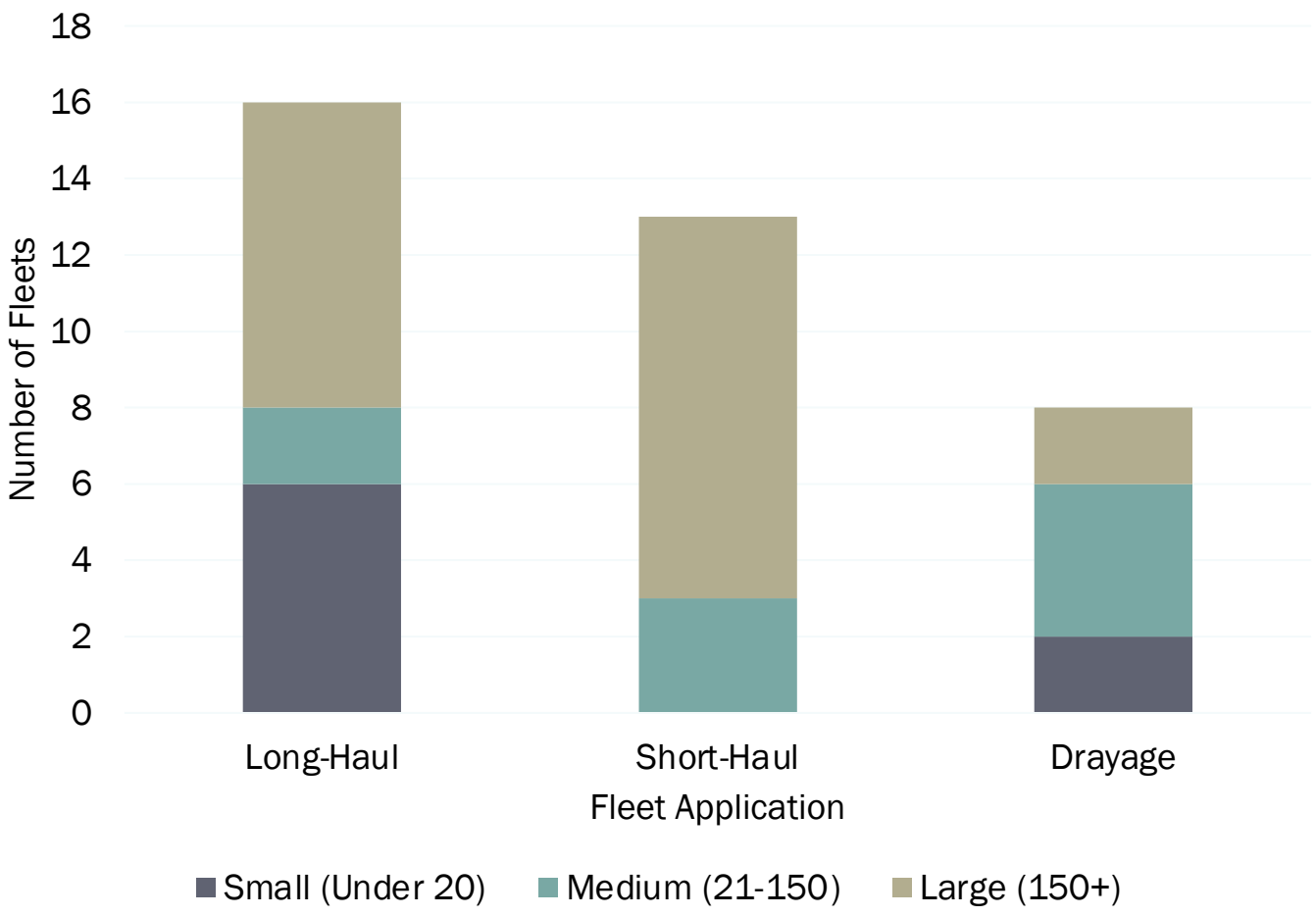
How do fleets think about electrification?

What prevents them from purchasing electric vehicles?

Interviews help understand perspectives of fleet decision-makers

# Methods and Sample

- 28 Semi-structured, hour-long interviews
- Sampling for fleets with and without electric truck experience
  - Eight fleets had experience with electric trucks: five large fleets and one medium fleet.




Note: Fleets can be included in multiple application types. Therefore, the total number of fleets does not equal 27

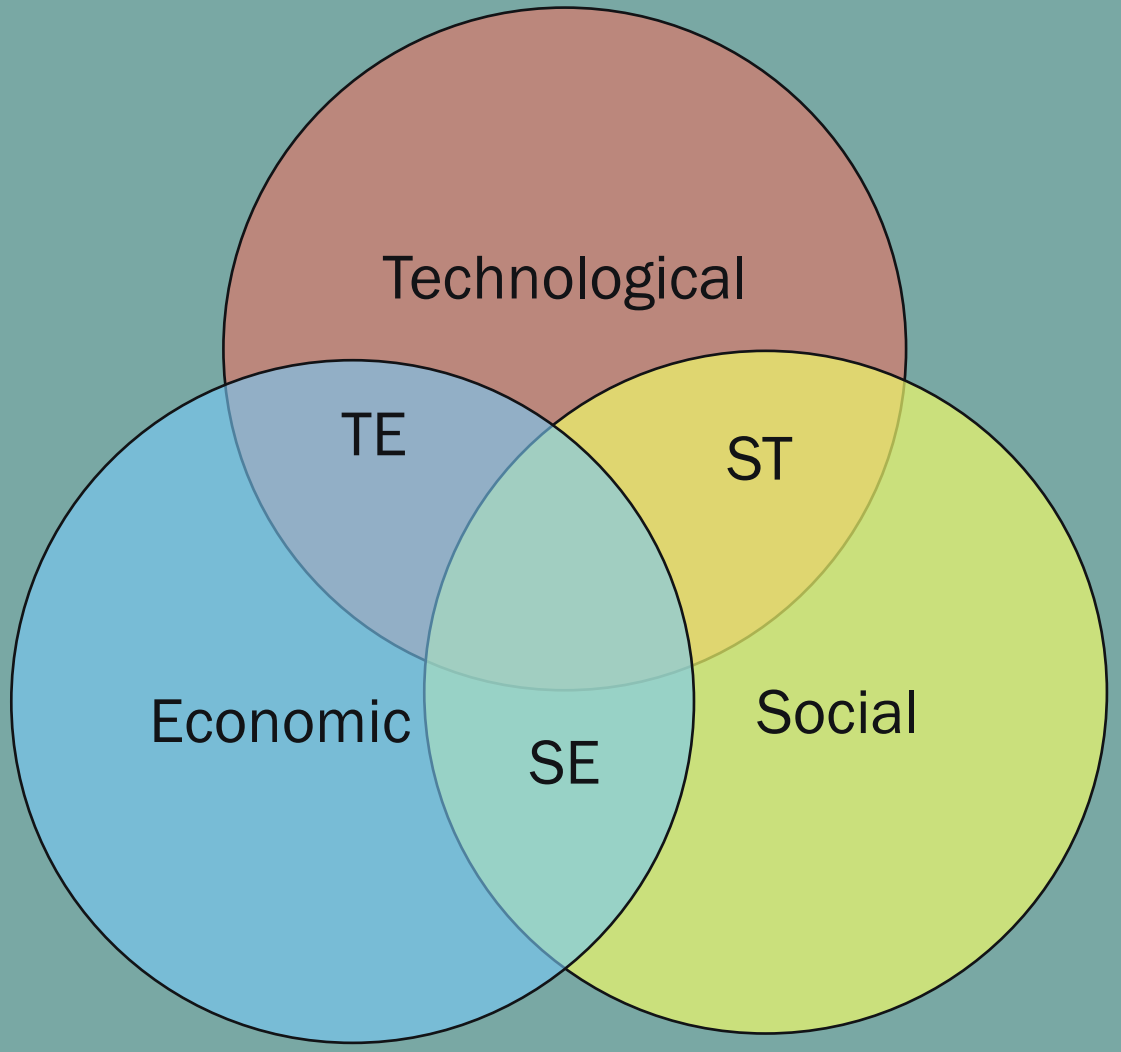
# Barriers Categories

**Technological (T):** Issues with the functioning of the truck

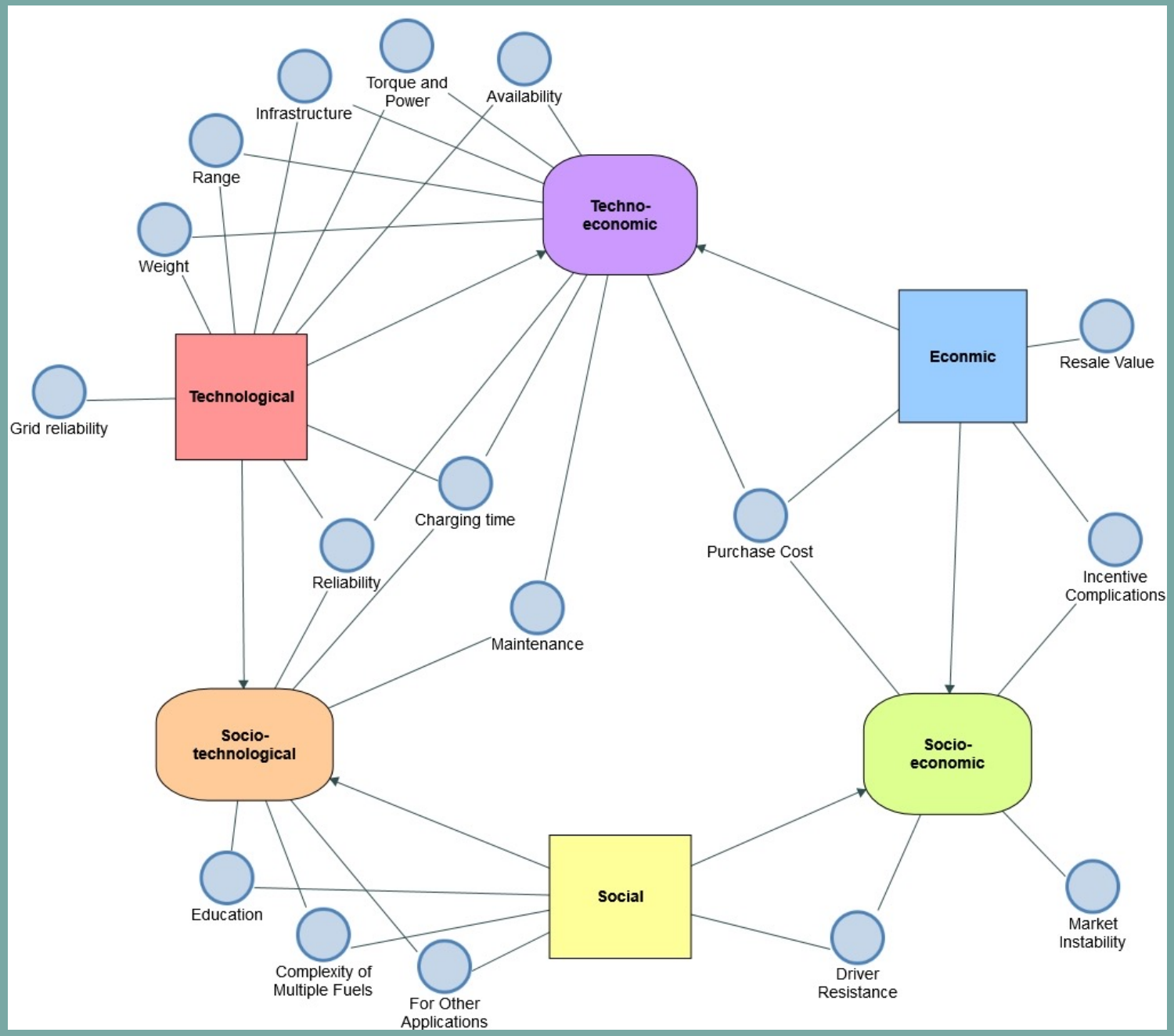
**Economic (E):** Related to the financial operations of the organization

**Social (S):** Perceptions of the truck by people

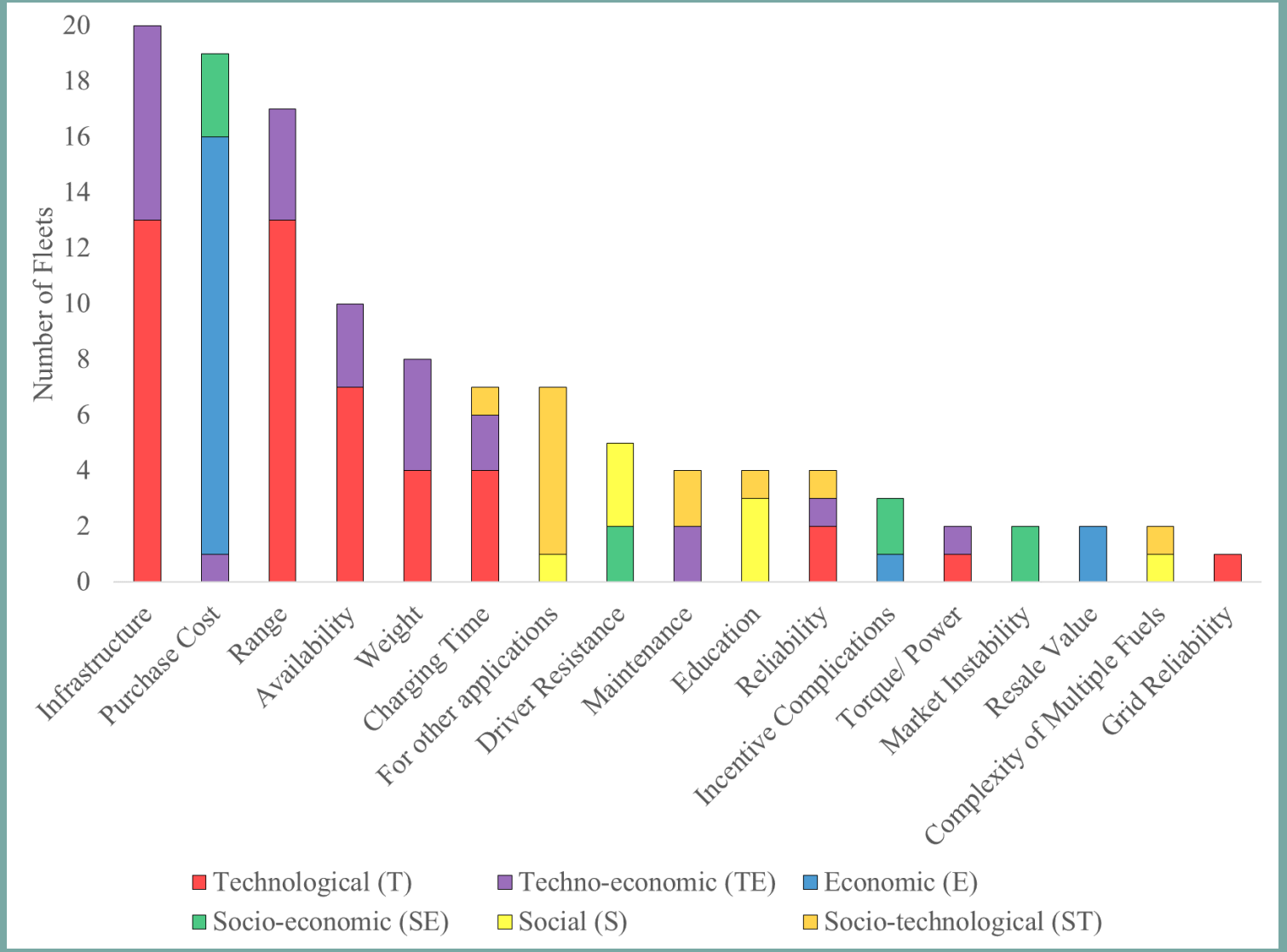
**Hybrid (SE, ST, TE):** Barriers having characteristics of two barrier categories



Concept map of barriers to electric truck adoption classified into social, technological, economic, and hybrid categories.



Reported barriers to fleet adoption of electric vehicles subdivided by barrier type (n=28)



# Infrastructure

- Interviewees describe charging infrastructure as almost nonexistent outside of California
- Fleets often refuel diesel trucks at public stations and would similarly be reliant on public charging stations to recharge electric trucks
- This impacts both physical and financial operations

*"For somebody like me who runs quite literally from Alaska to Florida and every place in between,* ***I need something that's going to have all the infrastructure already in place and readily available****."* (Fleet 19, T)

*"My trucks are running all over the West Coast and* ***they have to be able to work wherever I go. And if they don't, I can't buy the trucks, it's just not going to work****."* (Fleet 04, TE)

# Purchase Cost

- Economic, socio-economic, and techno-economic barrier
- Fleets were unable to pass higher costs on to their customers because they would be outbid by fleets operating diesel trucks
- This strains their relationship with customers

*"I don't know who can afford a brand-new electric truck,* ***there's no 20-fleet company that can afford a half-a-million-dollar trucks****, it's just not going to happen."* (Fleet 10, E)

*"The highest we got was seven hours in one day and then that truck had to go in and charge for six to eight hours.* ***I cannot afford to buy an $814,000 truck and get six hours out of it*** *and then charge for the next shift, there's no way." (Fleet 05, TE)*

# Range

- Not exclusive to long-haul applications
- Concerns about the viability of the battery in cold weather and frequent charge cycles
- If trucks are unable to meet daily milage requirements, this impacts revenue

*"You gotta pay attention to where you're going and how far you're going.... **The fleet manager is not going to look for a larger battery pack than they need because it costs more money**."* (Fleet 07, TE)

"[The truck will] lose anywhere from 20 to 40% of range when the weather gets cold and **we just couldn't deal with that in a trucking company, I mean we just couldn't, there's just no way**." (Fleet 01, T)

# For Other Applications

- Fleets shift responsibility to for demonstrating electric truck feasibility
- Done by fleets in all sizes and applications

*"**I'll leave that to the younger kids** who can invest more time. I've only got 6-7 years [left driving] and I'm going to try to do it as cleanly, efficiently, and with as less stress as I can."* (Fleet 24, S)

# Interviewee Recommendations to Increase Adoption

- Setting internal company policies
- Funding for technology experiments
- Demonstration projects
  - Meet drivers where they are
- Targeting willing drivers
  - Peer-to-peer information sharing

# Conclusions

- Barriers are discussed as such due to their deviations from diesel trucks
- Technological and economic changes are important
- Policies should also focus on operational and behavioral solutions
- Requires support from both new and traditional stakeholders

# THANK YOU!

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