Barriers to EV Adoption for Fleet Owners

ZNE Alliance

The Lancaster Advanced Energy Community Project

Index

Key Barriers - Market

Price

Challenge	For Consumers	For Fleets
Upfront Vehicle Cost	~50% of consumers not willing to pay price premium for electric vehicles[1]	Price premium still a concern, though Total Cost of Ownership (TCO) calc more favorable to EVs
Charging Infrastructure	At-home charging infrastructure costs generally small part of upfront EV cost	For some firms, charging time corresponds with peak operations; requiring expensive electricity infrastructure upgrades[2]
Demand Charges	At-home charging, in concert with lower EV tariffs, generally does not result in high demand charges	Demand charges from electricity providers can become prohibitively costly in the fleet context

Key
Black text = high importance
Grey text = low-medium importance

[1] *Unplugged: Electric Vehicle Realities versus Consumer Expectations.* Deloitte 2011.
[1] *Bay Area Plug-In Vehicle Readiness Plan.* Bay Area Air Quality Management District, 2013.

Key Barriers - Market

Technology

Challenge	For Consumers	For Fleets
Range / Perception of Range	While approximately 2/3 people drive less than 50 miles/day, limited range is one of the main reasons cited by consumers to not purchase EVs[1]	Many fleets have wide variation in route length; even when some routes are within range, EV limits affect vehicle interchangeability
Charging Time	For consumers with irregular schedules, difficult to guarantee ~8 hours of Level 1 charging, though Level 2 uptake increasing	Some fleets have less predictable day-to-day routes, rendering reliance on low-cost Level 1 charging untenable

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[1] *Consumer Acceptance of Electric Vehicles in the US.* The international Council on Clean Transportation. December 2012.

Key Barriers - Market

Market Maturity

Challenge	For Consumers	For Fleets
Limited Vehicle Aavailability	No adoption challenge for sedans, though consumers seeking other vehicles (trucks, SUVs) face limited choices	Still limited availability of MDV/HDV for a variety of purposes
Limited Charging Availability	Many workplaces lack chargers; Many multi unit developments (MUDs) lack charging infrastructure; MUD installation can be fraught with difficulty	In-route charging requires significant planning and may require both public and private investment
Nascent Resale Market	Nascent resale market in development, but still holds uncertainty for new car buyers incorporated resale potential into value calc	Developing resale market adds uncertainty for fleet managers calculating EV value proposition

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Grey text = low-medium importance

Key Barriers - Institutional

Challenge	For Consumers	For Fleets
Long Vehicle Lifespan Leads to Slow Replacement Rates	New vehicle purchase opportunities are generally infrequent	10+ year replacement rates slow even the most ambitious replacement efforts
Cap Ex vs Op Ex Budgeting	No direct adoption challenge	While Total Cost of Ownership calculations have EVs equal or cheaper than conventional, fleet budgeting captures initial vs ongoing spend in different budgets[1]

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[1] *Consumer Acceptance of Electric Vehicles in the US.* The international Council on Clean Transportation. December 2012.

How solutions address challenges

	Challenge	Relevant mitigating solution
Market	Upfront Vehicle Cost	1 Grid services and CAISO market mechanisms 4 Group procurement 6 Natural market development
	Charging Infrastructure	3 Optimize EVSE deployment 6 Natural market development
	Demand Charges	5 Load management and energy storage
	Range/Perception of Range	3 Optimize EVSE deployment 6 Natural market development
	Charging Time	3 Optimize EVSE deployment, through increase of DC fast chargers 6 Natural market development
	Limited Vehicle Avail.	6 Natural market development, augmented with dealer outreach
	Limited Charging Avail.	3 Optimize EVSE deployment, through optimized investment 6 Natural market development
	Unknown Secondary Market	2 Innovative fleet financing and ownership models 6 Natural market development
Institutional	Slow Replacement Rates	2 Innovative fleet financing and ownership models 6 Natural market development
	Cap Ex vs Op Ex	2 Innovative fleet financing and ownership models

Solution overview

	Solution	
1	Grid services and CAISO market mechanisms	• Incorporating revenue streams from grid services and CAISO market mechanisms into TCO value calculations
2	Innovative fleet financing and ownership models	• Fleet specific leasing models • Using TCO instead of CapEx/OpEx
3	Optimized EVSE deployment	• Use cutting edge tools to optimize EVSE siting and partnerships to develop grant funding
4	Group procurement	• Partner with other fleet owners to increase bargaining power with vehicle manufacturers
5	Load management and energy storage	• Incorporate load management technology and practices • Use stationary storage to mitigate demand charges
6	Natural market development	• Take advantage of natural market evolution as tech and growth drive down vehicle price and improve performance

Lancaster-specific challenges

Long distances between destinations	Lancaster residents have a ~20% higher commute time than average Americans, implying that both distances and traffic times contribute to longer trips.[1] This increases the importance of ensuring EV range is adequate for fleet use.
Many single family homes	Lancaster has about 24% higher single-family residences than average.[2] While this can be boost individual EV uptake, demand is relatively reduced for MUD EVSE installations, which can provide the concentrated customer base needed for successful EV car sharing services
Existing fleet electrification stresses grid	The Antelope Valley Transit Authority is planning on electrifying 80+ buses, the largest electric transit fleet deployment in the US. While this is a great leap forward for EV adoption in transit fleets, grid impacts must also be managed with any additional fleet electrification

[1] U.S. Census Bureau; American Community Survey, 2010-2014 American Community Survey 5-Year Estimates, Table DP03; generated by Jane Chipman; using American FactFinder; <http://factfinder2.census.gov>; (30 October 2016).

[2] U.S. Census Bureau; American Community Survey, 2010-2014 Selected Housing Characteristics, Table DP04; generated by Jane Chipman; using American FactFinder; <http://factfinder2.census.gov>; (30 October 2016).

Lancaster-specific solutions for AEC project

1. Incorporate revenue streams from grid services and CAISO market mechanisms into value calculations with AVTA Vehicle Grid Integration project

2. Overcome challenges posed by Cap-Ex versus Op-Ex accounting practices by exploring TCO calculations and leasing of vehicles to achieve electric price-parity with conventional

3. Equip Lancaster leaders with cutting edge tools to optimize EVSE deployment

4. Explore partnerships to enable sourcing of best OEM/dealer offerings via group purchase arrangements

5. Incorporate charging stations equipped with stationary storage with charging stations into DER Valuation Framework and explore integration with existing projects