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TO: California Energy Commission Dockets Office
RE: Docket Number 10-ALT-1; 2011-2012 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program: **Research on Electric Vehicle Owners in Multifamily Housing**
DATE: August 22, 2011

In Los Angeles, as in many California cities, over fifty percent of households reside in some form of multifamily housing (including commercial and residential apartments, condos, and trailer parks).[1] Recent research from both UCLA and UC Davis indicates that many of these multifamily residents hope to be early or middle market adopters of electric vehicles. However, research also shows that the costs of installing chargers can vary from 2 to 10 times that of installations in single family homes.[2] This creates a potentially significant challenge for growth in California's regional PEV markets, and doing so in a socially equitable manner so that all can share in the fuel cost savings of owning a PEV. We propose two sets of research activities below that begin to better define and address the nature of these challenges for PEV's in multifamily housing.

Developing charging station business models for multifamily housing owners. In order for PEV renters to have access to residential charging stations, multifamily property owners must choose to install them. We propose undertaking a study from the property owner perspective that characterizes the business opportunity and challenges associated by investing in and managing on-site charging stations in a multifamily environment. While recognizing the differences across types of multifamily housing, our study would propose policies and solutions that can lower barriers to installing charging stations by analyzing the financial, regulatory, and technological conditions. We seek to answer the following research questions:

1. Within multifamily housing environments, which parking spaces might be available for conversion to charging stations? How will on-site charging for renters affect the owner's assignment of parking spaces to tenants? (For example in condos parking spaces are property tied to the unit while in apartment buildings assignment methods can vary. The number, configuration and management (methods of assignment/ownership) of parking will determine a property owner's options.)

[1] http://luskin.ucla.edu/content/realizing-potential-los-angeles-electric-vehicle-market
[2] http://luskin.ucla.edu/content/addressing-challenges-electric-vehicle-charging-multifamily-residential-buildings

2. What are the costs of installing charging stations within multifamily units? How do these costs vary across types of housing and on which factors do they depend? (How does the vintage and electrical configuration of a building matter?)
3. How will the property owner gauge demand (utilization) for on-site charging stations? Will having PEV charging stations increase occupancy rates and durations?
4. How does an owner select the optimal number and type of charging stations given demand? (What is their planning horizon and what rate of return should they expect?)
5. If a charging station is servicing more than one tenant how should it be managed? How are emerging charging station technologies affecting management options?
6. How can the property owner recoup the cost of their investment in charging stations? (While a separate meter may allow the assignment of electricity costs to PEV tenants, the owner must also recoup their capital investment costs. Should this be done through higher rents, (if so how high?) or a separate utility bill for PEV services? If so how is this calculated and by whom?)
7. Under what conditions might it make sense to lease parking space to a commercial manager of a charging station?
8. What consulting services are available to assist in these planning and investment decisions and at what costs?

Design Public Policy to support the adoption of PEV by multifamily residents. The City of Los Angeles has implemented PEV policies and it will therefore be a natural case study. The study of other cities will be determined based on available funding.

1. How much will the presence of multifamily housing constrain PEV adoption (and market growth) across different California cities compared to adoption rates among residents of single family housing? (How are charging costs likely to differ on average across single family and multifamily housing in each metropolitan area? How many prospective PEV owners live in single family versus multifamily housing respectively?)
2. To maximize the effectiveness of PEV program incentives (for charging stations and time-of-use PEV-pricing for electricity) across types of multifamily housing how should these programs be tailored to the multifamily context? Should they target specific types of multifamily housing (e.g. most cost effective types)?
3. How should building and safety codes continue to adapt to facilitate the safe and expeditious installation of charging stations in new multifamily structures? (Should commercial and residential condominiums and trailer parks have different requirements?)
4. How well are the current green building standards performing in the multifamily context?(The study will also analyze the locations and buildings of future “PEV-ready” multifamily housing in cities that have mandated electric wiring in parking spaces to accommodate charging station installations for new construction.)

5. What is the potential for multifamily PEV policy incentives to vary geographically in order to target air pollution hot-spots (e.g., concentrations of ultra-fine particulates) within urban landscapes?
6. How effectively could the public sector support the adoption of PEVs by multifamily residents through adjacent curbside night-time charging stations when on-site charging is prohibitively expensive?
7. Similarly how effectively could the public sector support the adoption of PEVs by multifamily residents through workplace or workplace-adjacent charging opportunities?

This last focus on workplace charging overlaps with the CECs interest in workplace charging solutions, and the potential for solar energy to off-set peak period energy demand from PEVs.[3] Presumably, many multifamily residents drive to work and park for extended periods in public and private parking lots and garages.

Our proposal is consistent with the *Investment Plan* which has identified the need for "diverse" solutions to the "complex" issue of charging electric vehicles for multi-dwelling unit (MDU) residents[4]. The Luskin Center is developing this proposal in coordination with the California Plug-in Electric Vehicle (PEV) Collaborative and Joel Pointon, an expert on challenges to MDU charging issues from San Diego Gas & Electric.

The Luskin Center thanks the CEC for consideration of this docket submission and hopes that these comments are helpful to the development of an effective research and policy agenda. For further information please contact the following persons:

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[3] Smith, Charles, Miles Roberts, Jim McKinney. 2011. ***2011-2012 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program*** Committee Draft Report. California Energy Commission, Fuels and Transportation Division. Publication Number: CEC-600-2011-006-CTD. Page 37-39.

[4] Smith, Charles, Miles Roberts, Jim McKinney. 2011. ***2011-2012 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program*** Committee Draft Report. California Energy Commission, Fuels and Transportation Division. Publication Number: CEC-600-2011-006-CTD. Pages 34-37.