ELECTRIC VEHICLE CHARGING IN APARTMENT-BASED HOUSING

Obstacles & Opportunities

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The consulting companies of EV Charging Pros and LightMoves prepared this document with funding received from NOVA Workforce Development. The document is intended to assist owners and managers of apartment-based housing properties to better understand current topics that influence the decisions to deploy EV-charging infrastructure in apartment complexes.

The views expressed in this document are solely those of the consulting firms EV Charging Pros and LightMoves. Neither the sponsoring agency, NOVA, nor any of its employees make any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information disclosed within this document.
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Bryan Tyler, Portfolio Analyst, Pacific Urban Residential
John Kalb, President, EV Charging Pros

EV Charging Pros (EVCP), founded in 2012 by John Kalb, is an independent consultancy that assists commercial property and workplace owners, HOAs, architects, developers and builders understand the business realities of EV charging. The firm offers clients a total solution that includes developing business models and organizational planning, independent equipment vendor assessment, site selection and management of RFPs, bids, awards, and installations. EVCP provides a range of services including education, case studies, best practices, demand analysis, power availability, permits, code and fee review, and charging infrastructure deployment. Mr. Kalb is also on the board of directors of Charge Across Town, City CarShare, and California EV Alliance. EV Charging Pros is based in Novato, California.

Jim Helmer, President, LightMoves

Founded by Jim Helmer in 2010, LightMoves is an independent consultancy that has played a major role in EV charging infrastructure policy, model regulations, and installation standards. He has written or co-authored EV planning and technical guides for Hawaii (EV Guidebook for Commercial Station Installations), Washington (Electric Vehicle Infrastructure: A Guide for Local Governments), and Sonoma County (Electric Vehicle Infrastructure Charging Station Program and Installation Guidelines), as well as Ready, Set Charge California: A Guide to EV-Ready Communities. His work in Sonoma County helped that agency be recognized in 2011 and 2012 as the most EV-ready community in Northern California. In 2013, LightMoves moved its focus to the development, installation, and administration of EV charging installations in MUD housing. Mr. Helmer is a registered professional engineer in both civil and traffic for the State of California and a professor at the Mineta Transportation Institute at San Jose State University. LightMoves is based in Ben Lomond, California.
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<td>1. Apartment property managers and site-based facility personnel do not understand the nuances of evaluating multiple issues and the systems on their properties for deploying electric vehicle system equipment (EVSE) projects. Further, they are rarely asked to create business strategies and have limited authority to undertake projects. They are generally providing information to higher levels of property management or owners.</td>
<td>Create <em>EV Deployment for MUDs</em>. Focus on developing usable checklists and guides that can assist a self-directed multi-unit dwelling (MUD) site manager through a detailed property and electrical assessment review, as well as the development of a site-based charging scenario plan.</td>
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| 2. Apartment property owners are not investing in EVSE projects due to a lack of perceived demand by residents, incomplete project planning, unknown and potentially significant capital costs, complex ownership decision-making models, and most importantly, no realistic business model that fits with their existing business criteria. With little or no interest to invest in charging infrastructure improvements, there is even less interest in paying for the electrical, parking, and business assessments, as well as spending time on resident surveys required to plan and make decisions. | A tiered state funding program should be put in place that:  
1. creates standardized accredited curricula for MUD EVSE assessments and business planning;  
2. trains and certifies a workforce that has completed the accredited curriculum; and  
3. provides grants to pay the cost of the trained workforce to conduct EVSI assessments for MUD properties. |
| 3. Property improvement upgrades, building renovations, providing amenities for all residents, and capital maintenance expenditures have first precedence in annual budget decisions made by MUD owners. Given these budget priorities, the availability of EVSE grants would significantly increase the likelihood of property owners undertaking electric vehicle infrastructure projects. | The State should establish a capital improvements grants program (cost sharing) for MUD property owners that have utilized certified assessors to plan and design EVSE projects and that have a business model in place at the time of grant approval. |
NOVA Workforce Development is a nonprofit, federally-funded employment and training agency that provides customer-focused workforce development services. NOVA teams work closely with local businesses, educators, and job seekers to ensure that their programs provide opportunities that build the knowledge, skills, and attitudes necessary to address the workforce needs of Silicon Valley. An underlying mission of NOVA is to enable job seekers to transition back into the workforce by providing new skills, new connections, new information, and new opportunities. NOVA is directed by the NOVA Workforce Board, which works on behalf of a seven-city consortium composed of Cupertino, Los Altos, Milpitas, Mountain View, Palo Alto, Santa Clara, and Sunnyvale.

NOVA is the recipient of California Workforce Investment Board (CWIB) and California Energy Commission (CEC) Regional Industry Cluster of Opportunity grants to promote EV adoption in the San Francisco Bay Area. To guide these efforts, NOVA created the Silicon Valley Electric Vehicle Opportunity Initiative (EVOI). Partners include the Bay Area Climate Collaborative (BACC), Prospect Silicon Valley, San Jose State University’s Mechanical Engineering Department, the California community college system, Recargo/PlugShare, LightMoves and EV Charging Pros consultancies, and the work2future and San Mateo County Workforce Investment Boards.

The goal of this project is to provide a “voice of the customer” perspective and information about current plans, policies, and procedures involving the installation and management of electric vehicle infrastructure in apartment-based housing. To achieve this goal, the consultants formed an electric vehicle advisory team (EVAT) under the auspices of the California Apartment Association, Tri-County Division¹ (CAA-TC), which is based in San Jose. The EVAT was formed after issuing a CAA-TC interest survey to its 3,000+ members.

The consultants then interviewed and surveyed EVAT members, and held a workshop for these members to gain a better understanding of their awareness of electric vehicle (EV) charging business models, site and electrical considerations, and local planning and building regulations. They also interviewed public and non-profit housing agencies in an effort to understand where EV charging requirements fit in general plans, Housing Elements, and development activities. By collaborating with large and small rental property owners and managers, the CAA-TC staff, and public and non-profit housing agencies, the consultants learned about the current understanding, knowledge, and attitudes about electric vehicles, charging basics, and business models.

The first deliverable of the project was a stand-alone Powerpoint presentation, “EV-101 for Multi-Unit Dwellings.” NOVA intends to transmit this to CAA-TC for use with its membership. “EV-101 for Multi-Unit Dwellings” provides property managers and owners with basic information about plug-in electric vehicle makes and models, as well as national, state, and regional sales patterns. It references current California legislation (AB-2565)² involving the rights of tenants requesting electric vehicle infrastructure and provides examples of local planning department requirements. It also describes charging basics, site planning, and electrical considerations for charging infrastructure.

By taking surveys, holding interviews, and conducting a workshop with housing industry representatives, the consultants received valuable input and insight on the current attitudes and perspectives involving apartment-based electric vehicle (EV) charging services. This formed the basis for the creation of customized survey templates that CAA-TC and NOVA can now use and share with other CAA divisions and public or non-profit organizations. To the extent possible, the consultants explored different segments of the apartment industry, based upon type, size, and parking provisions to determine different perspectives and approaches to providing EV charging infrastructure for residents and visitors. The survey response rates were not sufficient, however, to make the segmentation data statistically relevant, but the consultants believe current views on EV charging in rental-based housing are fairly consistent across all segments.
The consultants explored the opportunities for, and recommended development of curricula and training guides in regional occupational programs or at the community college or state university levels in the fields of multi-unit dwelling property assessments, electric load calculations, electrical service capacity, and charging business model basics. They also recommended that the State establish funding programs to develop the curricula, train and certify a workforce, pay for property assessments, and provide match-sharing grants for EV capital improvement projects for applicants that have had their properties assessed and have business plans in place.

3. EV DILEMMA IN CALIFORNIA: MULTI-UNIT DWELLINGS

Nearly every major auto manufacturer is now selling plug-in electric vehicles (PEVs) or soon will be. Because of a greater selection in makes and models, lower pricing, and increased driving ranges, battery electric vehicles (BEVs) are now outpacing sales of plug-in hybrids (PHEVs).1 Nationally, PEV sales rates are rapidly growing (30 percent increase in 2014 over 2013), and the hotbed for those sales is in California, where nearly 40 percent of the nation’s PEVs are being purchased.2 Not only does California lead the nation in PEVs purchased, but there are more PEVs in California than in any other country.3 As of the end of 2014, there were about 286,000 PEVs in operation in the U.S., and about 118,000 of those were owned or leased by California drivers. Not surprisingly, Silicon Valley and the greater Bay Area led California in PEV sales per capita.4

Governor Brown has set a goal of having 1.5 million zero-emission vehicles (ZEV) on California roads by 2025.5 To add nearly 1.4 million ZEVs in 10 years is an ambitious target. To help achieve this goal, the State offers cash rebates of up to $2,500 for the purchase or lease (three-year minimum) for BEVs and $1,500 for PHEVs.6 Further, incentives such as the use of high-occupancy vehicle (HOV) lanes by solo drivers in EVs and the most fuel efficient PHEVs has resulted in strong ownership patterns in congested metropolitan areas, including the San Francisco Bay Area, Los Angeles, and San Diego.7 To help spur PEV sales in some parts of the state, such as the San Joaquin Valley Air Pollution Control District, additional rebates of up to $3,000 above the state rebate are available to residents who purchase or lease BEVs.8 Policy makers for many of the state’s air quality districts and metropolitan planning organizations are providing lucrative grants for the installation of public charging stations and for conversion of local government fleets to alternative fuel vehicles. In his 2015 budget, President Obama is also proposing to Congress to change the maximum $7,500 federal tax credit for the purchase of a PEV to a point-of-sale rebate worth a maximum $10,000.9 Many local agencies also offer free or heavily discounted charging fees in their public parking facilities.

Even with all the national, state, regional, local, and automotive industry incentives available, there is still a very obvious imbalance in the ownership of PEVs in multi-unit dwellings (MUDs). Research from the Electric Power Research Institute (EPRI) and others indicate that about 80 percent of all PEV charging occurs at home.10 Yet, while condominiums and apartments make up about 34 percent of California’s dwelling units, less than 5 percent of home-based charging occurs in MUDs.11 The high percentage of charging that is occurring in detached housing (about 95 percent) is reflective of who is buying or leasing PEVs, as well as the ease of plugging into existing outlets or upgrading to higher amperage circuits in a homeowner’s garage. Project research indicates that many apartment residents have not yet requested charging stations and those “future residents” looking for apartments have not yet requested EV charging as an amenity that would sway their decision about where to rent their next apartment.

It is also clear that property owners are the final decision makers in deploying EV charging on properties. However, the process is complicated because, in many cases, owners are not easily available and are making decisions based on other considerations than the specific need for charging by residents.

For example, in most corporate apartment ownership organizations there is a site-based property manager who directly interacts with residents and hears their requests for charging infrastructure. This site-based manager might take the initiative to call an electrician or a vendor to explore the requirements for charging. Inevitably, they will have to bring the
proposed budget up to a local or regional asset manager for approval. If the capital requirement is greater than a $10,000 range then the asset manager must decide if the total capital improvement budget for all properties he or she is responsible for can support a charging project.

Owners are then sought out to make decisions, and their criteria are based on bigger economic considerations, such as net operating income and overall asset value. The property owner must also consider the age of the property and how they view it in their portfolio. Is it a long-term hold or short-term turn?

Decisions are often further complicated by the role of for fee-based property management organizations. These firms may manage multiple properties for different owners, increasing the administration required to present, explain, and get decisions required to deploy EVSE. Furthermore, these organizations report that they will not undertake a planning process unless owners have agreed to pay for the service. This creates a classic Catch-22; the property manager cannot assess the project until the owner approves funding; the owner won’t approve funding because he or she does not understand the issues and does not want to pay to be educated on the issues.

Some of the factors that are under consideration by stakeholders in the decision chain include:

- **At the site:** Resident demand, power infrastructure, metering of energy, parking models and configurations, recouping of costs, administration.
- **By asset managers:** Total capital budget for properties, priorities, and how EV charging drives occupancy demand and economics for rental fees.
- **By owners:** Why invest in charging infrastructure if the building is due to be sold? How does charging infrastructure increase asset value or increase net operating income? And other traditional ownership metrics.

With such a high percentage of PEVs residing in garages of single detached homes, and with competing business interests in apartment-based housing, the dilemma in the industry becomes:

> Why would apartment owners, who have more pressing needs and higher priorities than installing EV infrastructure, pay to have it installed when renters are not requesting it, nor is there any indication that it would be used or generate any return on their investment?

The decision to install charging infrastructure in owner-based MUDs (condominiums) appears to be less challenging. Home Owner Association (HOA) board members making charging decisions are not only in control of the Association’s funds, but they own their living units and possibly are in the market or have already purchased a PEV. They are also in a position to more easily influence HOA board votes, or in some cases they may be voting board members.
4. PROJECT ELEMENTS

4.1 PARTNERSHIPS

The project called for collaboration with two local housing agencies or planning departments and the formation of a working partnership with CAA-TC. The CAA-TC advisory team played important roles in the project. It was the key resource the consultants used to interview, survey, and hold working group meetings about their respective properties. It also served as a sounding board and advisory group to CAA-TC leadership.

The consultants met with two public agencies, the City of San Jose Housing Department and the City of Sunnyvale Community Development Department. A meeting was also held with a highly recognized non-profit developer of affordable housing, First Community Housing of San Jose. With the Department of Housing in San Jose, the conversation focused around future policy development, its state-required Housing Element, and planning for EV infrastructure in multi-unit housing projects. With Sunnyvale, the discussion centered more on construction activity and reaction from builders in light of its 2012 ordinance requiring EV infrastructure in all developments. With First Community Housing, the discussion revolved around alternative forms of transportation, LEED, and sustainable development.

California Apartment Association, Tri-County Division

The consultants first met with the executive director of CAA-TC, Joshua Howard and his government affairs director, Rhovy Lyn Antonio, to describe the goals of the project. Howard expressed his appreciation and noted that with the passage of AB 2565, the issue of EV charging in apartment-based housing would become front and center for his organization and its members. CAA-TC leadership sent an electronic survey to 3,000+ members seeking feedback on the topic of EV awareness and interest in joining a working group within the organization to work with the consultants in Q4 2014 and Q1 2015. Only 23 members responded. While low, it did result in follow-on conversations between respondents and the consultants leading to the eventual formation of the working group referred to as the Electric Vehicle Advisory Team (EVAT). The EVAT provided direct lines of communications to key industry representatives, giving the consultants a solid understanding of their awareness of EV charging business models, site and electrical considerations, as well as local planning and building regulations. More information on EVAT is contained in Section 4.3 of this report.

Howard suggested that at the conclusion of the project, the Tri-County Division of CAA would include survey findings and summaries of the consultants’ and EVAT’s work in the statewide CAA Issue Insights newsletter and via email updates.

City of San Jose Housing Department

The San Jose Housing Department is a leader in the development of affordable housing projects by partnering with private and not-for-profit housing developers. Working with the San Jose Planning, Building & Code Enforcement Department, the two departments are primarily responsible for the creation and implementation of the City’s Housing Element (HE), a requirement of the State of California Housing and Community Department. The HE, updated in January 2015, contains multiple goals and objectives for the type and location of new housing in the City. While the HE discusses important issues, such as proximity to transit, convenient connections to walking and cycling, energy efficiency, and alternative energy, there is no mention of electric vehicle charging infrastructure. This reaffirms that, while the State has sustainability goals, climate protection laws, and building standards that require infrastructure for vehicle charging in new multi-use housing developments, reference to these laws, standards, and goals is lacking in local Housing Elements.
City of Sunnyvale Community Development Department

The meeting with Sunnyvale Community Development Department representatives included the NOVA project manager, Luther Jackson. Sunnyvale staff shared the Building Division Electric Vehicle Charging Guide Sheet that describes EV charging requirements in new developments in Sunnyvale. Since the implementation of the Sunnyvale EV charging infrastructure ordinance in July 2012, Sunnyvale staff indicated that no permits had been taken out for new apartment-based or condominium housing, thus they had not experienced the plan review, approvals, or inspection process with the code requirement for inclusion of EVSE. They did indicate that commercial (retail, auto-dealer, and office building) applications were the most common type of permits being issued for EV infrastructure. The conversation reaffirmed that existing rental property owners were not installing charging systems for residents at this time.

First Community Housing

The meeting and phone calls with First Community Housing (FCH) CEO, Jeff Oberdorfer, and his staff resulted in similar findings to those with San Jose and Sunnyvale. There were no known requests for charging infrastructure in their existing affordable housing projects, nor were they actively investigating the installation in future projects. They were not aware of the State requirements mandating its installation, but that was likely due to their cycle of project approvals occurring prior to state building code changes. FCH prides itself on building projects with high levels of LEED certification and climate protection, and plans to investigate opportunities for EV charging, particularly as it might coincide with car-sharing or ride-sharing for its tenants.

Takeaways from Partnership Meetings

- CAA-TC Division sees education of its members on EV infrastructure and legislation as an important goal, particularly with the impending July 1, 2015, implementation of AB-2565.
- It is indicated by the State Department of Housing and Community Development that Housing Element updates “can provide a vehicle for local governments to adopt housing and land-use strategies to address climate change and the reduction of greenhouse gas emissions.” Yet there is no mention of the Title 24 requirement for EV charging infrastructure in San Jose’s multi-unit housing element.
- While Sunnyvale codes require 12.5 percent of the total number of parking spaces in MUD projects be pre-wired for Level 2 EV charging—substantially higher than the state’s requirement of 3 percent—no permits have been taken out by developers renovating existing or building new MUD projects since the ordinance went into effect in July 2012.
- In low- and moderate-income housing projects, residents have a higher dependence on transit, walking, and cycling. FCH provides bus-passes at no cost to all tenants, installs bicycle locking and storage facilities, and attempts to locate projects in areas conducive to walking and transit.
- Currently there is a low level of interest in the development community to install charging equipment in multi-unit low and moderate-income housing projects that may only benefit a small fraction of tenants.
- On future projects, FCH will investigate ride-sharing (residents sharing a personal car) and car-sharing (residents using a commercially-owned rental car) parked on the premises. If car-sharing presents itself as a viable alternative, it would work closely with the car-share company to utilize PEVs and then provide the on-site charging equipment.
- Opportunities for EV or PHEV car-sharing exist in low- and moderate income housing projects as it lowers the cost of vehicle use, reduces parking needs, and benefits air quality, yet the consultants heard of little proactivity in the promotion of clean-vehicle car sharing.
4.2 SURVEYS

Two surveys were conducted as part of the partnership effort with CAA-TC. The first, Survey of California Apartment Association, Tri-County Division Membership, was developed to gain some insight into apartment-based charging systems and to determine the interest level of the more than 3,000 CAA-TC members in volunteering their time to be interviewed by the consultants and serve as a member of the EVAT. The fifteen-question survey was released electronically by CAA-TC to all its members and provided for a two-week response period. The survey and results are provided as Appendix B. In summary, four of the questions related to property type and size, ten were about current attitudes relating to EV ownership and charging and the final question asked about EVAT membership. The survey generated a meager 23 responses, with only seven of those showing interest to serve on an EVAT.

Takeaways from CAA-TC Membership Survey

☐ A response rate of only 0.7 percent illustrates little interest in apartment-based (MUD) EV charging at the current time.
☐ There are no significant proactive development plans or deployment strategies for electric vehicle charging at apartment-based properties.
☐ Most responses indicated that property owners had no plans to install electric vehicle supply equipment (EVSE) on their properties.
☐ There was almost no insight regarding tenant demand for EV charging equipment.
☐ Capital improvements, providing sufficient parking, and other tenant demands drive budgetary decisions for apartment owners and managers.
☐ There are many basic questions about how EV charging and program oversight work.

A second more qualitative survey, Survey of California Apartment Association, Tri-County Division Membership Electric Vehicle Advisory Team (EVAT) Members, was a much more comprehensive effort, and was conducted individually through meetings or phone calls with volunteering EVAT members. A total of nine EVAT members were surveyed. The questions and responses to the survey are illustrated in Appendix C.

Takeaways from the EVAT Survey

☐ Only one of the nine respondents had driven an EV and is now considering the purchase of one.
☐ While there has been little EV infrastructure put in place or interest-surveys taken, most respondents said that the fact that they are engaged on this topic demonstrates a proactive stance on EV charging.
☐ Residents who are using existing chargers prefer them to be in their dedicated parking spaces.
☐ Most respondents thought that reserving approximately 5 percent of all parking spaces would be an adequate amount of charging stations on their property.
☐ Property owners ultimately control capital improvement budgets, and the decision-making process is lengthy and complex.
☐ EV charging programs should produce a return on investment in three years or less.
☐ Property managers and owners do not want to be in the EV charging and administration business and would prefer to have partners (original equipment manufacturers or third-parties) oversee charging improvements and operations.
4.3 CAA-TC ELECTRIC VEHICLE ADVISORY TEAM (EVAT)

As indicated earlier in the **Section 4.1 (Partnerships)**, the project called for the formation of a working group within CAA-TC to act as a means for the consultants to interview, survey, and collaborate with key industry representatives. It was decided by CAA-TC leadership and the consultants and supported by the group to refer to them as the Electric Vehicle Advisory Team (EVAT). The advisory team would provide valuable input and review of work with the consultants, but also serve as ongoing liaisons and potentially serve as mentors to the rest of the CAA-TC membership and staff beyond the term of this project.

EVAT consists of the following members (volunteers):

- Rod Smith II: Senior Director of Engineering, Avalon Bay
- Mary Nitschke: Director of Ancillary Services, Prometheus Real Estate
- Ken Orvick: President, Orvick Management Group
- Greg Foley: Property Manager, Dixon Townhouses
- Pat Chapman: Community Manager, Hidden Lake Apartments
- Michael Pierce: President, Prodesse Property Management
- Christopher Peter: Managing Director, Equity Residential
- Karen Bowman: Regional Vice President, Sares-Regis
- Bryan Tyler: Portfolio Analyst, Pacific Urban Residential

A workshop was held with four of the EVAT members on February 26, 2015, at the CAA-TC office. A summary of the meeting is presented as **Appendix C**. Key takeaways from the meeting were:

- The volunteers showed that there is a need for more information about EV charging, business models, and legislation.
- EV charging in apartment-based housing should become part of the statewide CAA educational series for members.
- There should be a follow-up EVAT meeting in June 2015, prior to AB-2565 implementation on July 1.
- They recommend follow-on meetings to serve CAA-TC in an advisory role, and one or more members should be available at EV charging training classes, if they evolve.
- They reviewed and supported, with minor comments, making available *EV-101 for MUDs* to CAA-TC.
4.4 EV 101 FOR MULTI-UNIT DWELLINGS

A key component of this project was to provide an EV educational tool for CAA-TC staff to use with its membership. The tool would be easily disseminated electronically, taken to conferences and meetings, and updated as needed. The consultants developed and presented a Powerpoint slide deck at the February 26, 2015, workshop, on five key areas:

1. Vehicles and demand
2. How charging works
3. Local planning department considerations
4. Site and project considerations
5. Multi-unit dwelling considerations

EVAT members saw *EV-101 for MUDs* as an easy way to get EV basics out in front of CAA members, property managers and owners, and residents of the properties. *EV-101 for MUDs* is available on NOVA's website and a link to the website is contained in Appendix F.

4.5 OUTREACH

All material produced in this project becomes the property of NOVA. NOVA will disseminate *EV-101 for MUDs* to interested stakeholders. The survey results will be shared by NOVA with regional and state workforce training agencies, as well as the Bay Area Climate Collaborative, California Energy Commission, the statewide California Apartment Association, and other public and non-profit agencies. The consultants will participate in the outreach effort as needed. The consultants have also informed CAA-TC that they would lead a June 2015 workshop with EVAT members on AB2565 and would be available to conduct further training as needed.
5. KEY FINDINGS AND RECOMMENDATIONS

There were many findings discovered in the course of this work, not only about apartment-based housing EV readiness, but also about policy and planning readiness at the local government level. Below is a summary of the key findings and recommendations. Following those are other key takeaways from the project.

Key Finding 1: Apartment owners do not understand the business of EV charging

Apartment property owners, asset managers, and on-site personnel do not have ongoing resources to provide on-demand information about current EV market dynamics and case studies. While tenant and resident interest remains low and often non-existent in MUDs, apartment industry representatives face on-going solicitations by equipment OEMs to procure charging equipment that include quotations from their preferred electrical contractors. However, with these offers come little or no information about all of the business and legal decisions that need to be considered in evaluating, deciding upon, and deploying EV charging on their properties. Commercial charging equipment OEMs, electrical contractors, and utility company staff generally lack detailed information on the “business” side of MUD charging including:

- how to survey residents’ interest in PEV ownership;
- model procedures or guides on how to respond to requests from residents for EV charging equipment;
- details of local planning department permitting requirements;
- how to ensure installations comply with accessibility standards (ADA) and are properly signed and striped;
- insurance requirements and model agreements between residents and owners;
- how to set charging rates and/or parking fees to recover expenses; or
- how to monitor charging activities, analyze utility bills, or prepare financial reports.

Recommendation 1: Provide EV business training for MUDs

NOVA Workforce and/or other non-profits or public agencies should develop EV Deployment for MUDs, containing but not limited to training material addressing surveying resident interest, permitting, legislation, procedures, model agreements, accounting for EV charging, outreach, and marketing.

Key Finding 2: Apartment owners will not invest in EV charging projects without clearly defined market demand and cost estimates by property managers

Apartment property owners and their on-site or corporate property managers do not have an understanding of their electrical service from the utility drop point through the meter to panels and branch circuits. Most would not be able to determine how to increase and extend electrical service to accommodate EV charging in parking spaces. This lack of understanding results in them not being capable of clearly describing to a contractor what they want constructed. This is normal in a new industry where qualified, trained consultants and designers are few in number and generally don’t exist in the workforce.

Detailed, comprehensive assessments of electrical and parking systems are needed, but currently, management does not see these as investment priorities. This is driven by three main factors; a lack of perceived demand from tenants; the unknowns of the project alternatives or associated costs; and the likelihood of no return on a potentially significant investment.
Assembly Bill 2565, which takes effect July 1, 2015, requires most owners of larger (17 or more units) California apartment properties to allow tenants to pay for and install their own EV infrastructure. While intended to spark proactive EV infrastructure adoption, the law has the potential of promoting a “wait and see” attitude by the owners. Owners who believe the law to be a way for tenants to bear the infrastructure burden will find they will not have electrical capacity to install more than one or a very limited number of chargers. This reactive approach by owners will likely be sporadic and inconsistent and result in the need for eventual higher cost reconstruction and upgrades to replace initial installations and accommodate growing numbers of requests in the coming years.

As in the initial stages of alternative energy technologies, such as wind generation or solar photovoltaics, apartment owners face a lack of qualified technical experts. Owners are confused; they don't see any demand and are in a “chicken and egg” situation. With little or no interest by apartment property owners to invest in EV charging improvements, there is even less interest to pay for the electrical, parking, and business assessments to plan for them. Site managers and property owners are very reactive in planning for EV charging and will not make the necessary investments in time and money to plan for them. Typically the time from “I’m thinking about installing a charger” to receiving owner approvals to installation and deployment can be six to nine months. The current physical infrastructure in most apartments is insufficient to scale to ten or more charging stations. Apartment owners will not address the complexities of deploying large scale charging systems without seed money.

**Recommendation 2a:** State funding should be appropriated to create standardized accredited curricula for MUD EV infrastructure assessments.

NOVA Workforce and/or other non-profits or public agencies should support development of an accredited [*MUD EV Charging Infrastructure Curriculum*](#) to train a new workforce on how to examine properties and electrical systems, design and estimate projects, and develop all elements of operating and managing the systems.

**Recommendation 2b:** State funding should be made available for scholarships to train and certify a workforce that has completed the accredited curriculum.

Community colleges, state universities, and regional occupational programs should be funded to teach, train, and certify a new workforce using the curricula developed in **Recommendation 2a**.

**Recommendation 2c:** The State should provide seed monies and grants to pay the cost of the trained workforce to conduct EV infrastructure assessments for MUD properties.

With a trained new workforce utilizing skills and knowledge gained from standardized curricula developed as described in **Recommendation 2a**, the state should pay for this workforce to conduct comprehensive MUD EV infrastructure assessments at no cost to the apartment owners. The assessor would be responsible for working with the site owner and property manager to understand the issues and make decisions and have them commit to a plan that could be funded and deployed.

**Key Finding 3:** Property improvement upgrades, renovations, and capital maintenance expenditures take first precedence in apartment owner budgets

Capital costs for installing EV infrastructure often exceed $15,000, the approximate threshold triggering a significant business case analysis and a comparison against other capital priorities. Under current law, developers and owners are including minimal charging infrastructure with new development, while many existing property owners are now waiting for tenant demand under AB2565 with the possibility of sharing the cost of improvements with the requesting tenants.
**Recommendation 3:** In order to meet the Governor’s ZEV Infrastructure goals of 2020, the State should establish a capital improvements (cost sharing) funding program for property owners who have utilized certified assessors to plan and design projects and who have a business model in place at the time of grant approval.

Just as it makes sense for property owners to deploy a certified workforce utilizing current charging skill sets, techniques, and technologies, it makes sense for the state to establish an infrastructure investment incentive program for certified MUD properties. Today the State offers incentives for government agencies to convert to alternative fuel fleets and to install publicly accessible EV charging stations. It provides rebates and HOV use to EV owners, but it has offered very little in cost-sharing grants for installation of complete charging systems on MUD properties. The state’s investor owned utilities (IOUs) are exploring merits of similar programs. Unless the State or utility companies step in to pay for a lion’s share of electrical system upgrades, it is highly unlikely that the property owners of existing developments will see it as a feasible priority. Those property owners taking advantage of the assessments (certifications) would be the most qualified and first in line to take advantage of state-funded EV infrastructure installation grants for MUDs.

**Other Project Takeaways (personal interviews or aggregated survey responses):**

- The owners and managers interviewed have little or no interest in EV ownership at this time. Only one interviewee had driven an EV and was able to describe incentives being offered at federal, state, and local levels.

- Of those properties surveyed, there has been little to no interest from residents (tenants) or prospective residents for charging, except for one case. In that instance property management offered a single parking space with a 110 volt standard outlet placed on the carport support column. No monitoring system was put in place and the tenant has since moved and the space has reverted back to a standard space.

- For the most part, resident managers interviewed were not aware of AB-2565 or implications for property owners if residents begin requesting infrastructure as of July 1, 2015. A process for implementing AB-2565 should be developed and disseminated to property managers.

- On-site interviews showed low awareness of EV charging basics and site-specific infrastructure issues.

- Case studies are important. The focus should be more scenario-based and less what a specific apartment wants or did. For example, if you have deeded parking, here are alternatives. If you want to levy fees for charging, here are options. Other topics could include what to do if you want a turnkey provider or explaining when 110V works well.

- Emerging business models need to be thoroughly explained by equipment OEMs or the utilities offering them. The market offerings are fluid and what is available today may change tomorrow.

- Property managers who thought they had sufficient power to accommodate charging stations found the opposite after brief walking tours, inspecting panel capacity and circuits presently in use.

- Given the general shortage of parking and ADA requirements, figuring out how and where to deploy charging infrastructure is a complex problem for parking managers to solve.

- The bigger the property the more complex the decision-making process. Often no one on site actually has the authority to make final decisions. Investments in time and money need to move up the chain, often to a regional person and then to a company executive.
Corporate interviewees were more knowledgeable about the apartment charging from an organizational level but are struggling to set standards. The site-based asset and development managers are reluctant to commit scarce budget resources to charging infrastructure without a way to show direct links to occupancy rates, rents, or amenities that benefit all tenants.

There is bifurcation between retrofit development considerations and new development considerations. Retrofits are challenging for many reasons, including the capital cost of infrastructure, the need for policies development, the confusion about the long-term financial model, and ROI for charging. New developments face additional challenges, driven by the lack of perceived tenant demand to commit to design and construct scalable charging infrastructure.

The challenge of planning and constructing adequate service drops to serve the property; the lack of clear direction in California law and with local jurisdictions to gauge the scale of the deployment and the challenge of including a capital requirement that does not map to a specific financial profile that can be included in proposed rents.

Interviewees are receiving a lot of attention from vendors selling charging products. The key questions are: (a) will the vendor contribute to the capital costs for power and electrical upgrades; and (b) is the property owner going to be responsible for the charging program, fee setting, and policies and direct interface with users, or is this going to be managed by a third party service provider?
APPENDIX A: GLOSSARY & LIST OF TERMS

Battery Electric Vehicle (BEV)
Any vehicle that operates solely by use of a battery or battery pack, or that is powered primarily through the use of an electric battery or battery pack but uses a flywheel or capacitor that stores energy produced by the electric motor or through regenerative braking to assist in vehicle operation.

Charger
An electrical component assembly or cluster of assemblies designed specifically to charge batteries or other energy storage devices on board an electric vehicle.

Electric Vehicle (EV)
Any motor vehicle registered to operate on California public roadways and operates, either partially or exclusively, on electrical energy from the grid, or an off-board source, that is stored on board for motive purpose.

Electric Vehicle Charging Station (EVCS)
The public or restricted space serviced by a charger including all signs, information, pavement surfaces, surface markings and protective equipment, where the transfer of electric energy occurs by conductive or inductive means between the charger and the battery or other energy storage device on board a stationary electric vehicle.

Electric Vehicle Infrastructure (EVI)
Structures, machinery, and equipment necessary and integral to support an electric vehicle, including, but not limited to electric vehicle charging stations, chargers, and battery exchange stations.

Electric Vehicle Supply Equipment (EVSE)
The conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of delivering energy from the premises wiring to the electric vehicle. (National Electric Code, article 625).

Hybrid Electric Vehicle (HEV)
A type of vehicle which combines a conventional internal combustion engine (ICE) propulsion system with an electric propulsion system. The presence of the electric drive motor is intended to achieve better fuel economy than a conventional ICE.

Multi-Unit Dwelling (MUD)
MUD is a classification of housing (also known as multi-family residential) where multiple separate housing units for residential inhabitants are contained within one building or several buildings within one complex. A common form is an apartment building.

Plug-in Electric Vehicle (PEV)
A type of vehicle that has the capability to plug-in and charge its battery from the electric grid. This includes both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEV).

Zero Emission Vehicle (ZEV)
ZEV is a vehicle that emits no tailpipe pollutants from the onboard source of power. Harmful pollutants to the health and the environment include particulates (soot), hydrocarbons, carbon monoxide, ozone, lead, and various oxides of nitrogen.
APPENDIX B: SURVEY & RESULTS
CALIFORNIA APARTMENT ASSOCIATION, TRI-COUNTY DIVISION MEMBERSHIP

A Note about Survey Methods

While standard quantitative and qualitative survey techniques were used in both surveys, the low number of respondents and interviewees means that results are not statically valid. Furthermore, not all respondents answered all questions and in some cases gave multiple responses to questions. All percentages used are for informational purposes only and should not to be interpreted as statistically accurate. The consultants believe the survey response accurately reflects that EV charging is not high on the priority lists of apartment owners and managers. In that sense, the survey provides a valuable benchmark.

PROPERTY TYPES

![Bar chart showing the types of properties operated by respondents]

How many units, on average, are at each property where EV chargers are being considered?

![Bar chart showing the number of units at each property size]

Takeaway

Respondents operate a large number of garden apartments and are considering charging infrastructure across a wide density of units.
**CHARGERS DEPLOYED**

<table>
<thead>
<tr>
<th>Are there currently EV Chargers on properties you own or manage?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

**Takeaway**

The majority of respondents have not deployed any charging infrastructure. Only 4 out of 23 respondents have deployed charging infrastructure at all.

**FUTURE PLANS**

<table>
<thead>
<tr>
<th>When do you think you will install them?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

**Takeaway**

Seventy-five percent of all respondents have no plans to install charging at any time in the near future, if at all.
ARE CHARGERS NEEDED?

Takeaway

Most respondents have no idea about the number of chargers that might be required to serve their residents. Thirty percent thought that a minimal number—just one or two—would suffice.

IS CHARGING BEING ACTIVELY INVESTIGATED?

Takeaway

Ninety percent of organizations are not actively preparing for deploying charging at their properties.
Takeaway

Property owners and managers are not yet hearing requests for charging from existing or future tenants. This lack of demand from residents is often cited as a reason not to invest any time, effort, or financial resources on charging planning or infrastructure deployment.
**CHARGING AS AN AMENITY**

Takeaway

Charging is a low priority amenity. Often cited is the fact that an amenity is thought of to be for all residents, while charging is for only a few.

**AVAILABILITY OF GRANT FUNDING**

Takeaway

There is heightened interest in planning for projects based on the availability of grants to help pay for capital infrastructure improvement.
Takeaway

The highest priority issues for respondents when considering charging are the capital required, parking configurations, and the lack of market demand.

CURRENT QUESTIONS FROM RESPONDENTS

**Benefits**

- How will it benefit the owner?
- Are they going to be required at the property?

**Infrastructure & Costs**

- What infrastructure is needed to install a charging station?
- How much do they cost now to install?

**Parking Issues**

- How to manage/monitor and support equitable access to the EV charging stations without becoming a watchdog to it?
- How to handle with limited-parking situations?
APPENDIX C: SURVEY & RESULTS

CALIFORNIA APARTMENT ASSOCIATION, TRI-COUNTY DIVISION
ELECTRIC VEHICLE ADVISORY TEAM (EVAT) MEMBERS

Overview of Properties represented by Respondents

These nine organizations own and manage a total of 589 apartment buildings in California, and individual respondents are responsible for operations at 298 of these properties. Interviewees reported that 22 of their properties have some kind of charging infrastructure deployed and plans exist to deploy charging infrastructure in 40 additional properties. However, a major corporate initiative in conjunction with NRG eVgo accounts for 95 percent of those planned installations:

ELECTRIC VEHICLE EXPERIENCE

Takeaway

A distinct lack of driving experience means that the excitement and passion that comes with being an electric vehicle owner is missing, as is EV infrastructure advocacy.
ORGANIZATION PROACTIVE OR REACTIVE ON EV ISSUE?

Takeaway

While organizations consider themselves “proactive” on the EV topic, a minority of respondents have surveyed tenants or developed internal procedures and policies for EV Charging. This indicates that those participating consider thinking about the topic and participating in interviews to be proactive, rather than developing site-specific plans.
Takeaway

Interviewees indicated that all styles of parking exist on their properties. The general practice is to give a resident an assigned parking spot that is included with the rental fee and additional spaces are first-come, first-served or available for reservation with an additional fee. Indications are that residents would prefer to have charging associated with their specific reserved spots, which alleviates disputes and altercations about moving vehicles from fueling stations when not charging.
CHARGING INFRASTRUCTURE REQUIRED?

- 1 per 25 units
- Less than five percent
- Ten percent
- Ten chargers per 150 units
- 1 or 2 spaces
- No allocation

Takeaway

When asked unprompted how many spaces should be given over to chargers, there was a wide array of thoughts, and most indicated less than five percent of spaces should be allocated.

In this case, “allocated” is based on the property paying capital costs for charging infrastructure, but also represents the number of electric vehicles that interviewees thought would be parking on their property.

The projected growth curve of electric vehicle sales is a significant educational topic, especially given the CA ZEV Directive and the availability of longer-range vehicles with lower purchase prices in the coming years. The intersection of these projections would leave a wide gap between the number of vehicles purchased by residents and the number of allocated EV charging spaces on a property.
Takeaway

It is clear that property owners are the final decision makers in deploying EV charging on properties. However, the process is complicated, because in many cases, owners are not easily available and are making decisions based on other considerations than the specific need for charging by residents.

Decision factors under consideration:

- **At the site**: Resident demand, power infrastructure, metering of energy, parking models and configurations, recouping of costs, administration.
- **By asset managers**: Total capital budget for properties, priorities, and how EV charging drives occupancy demand and economics for rental fees.
- **By owners**: Whether to invest in charging infrastructure if building is due to be sold; how does charging infrastructure increase asset value or increase net operating income and traditional ownership metrics?
Takeaway

While the majority of interviewees said that charging infrastructure should break even in three years, the traditional ROI metric for capital projects in multi-unit organizations is now down to 12–18 months.

EV charging projects are currently at a disadvantage when being considered against other potential capital projects as they require significant capital costs and they do not have a significantly scalable revenue component to help create ROI.

EV charging project costs must compete with investments required for an amenity that can be used to drive rent increases (such as removing shared laundry facilities and placing a compact washer and dryer in each unit).

Takeaway

On-site administration of charging programs is determined by the administrative structure of individual organization. In some cases they would like turnkey programs, in others they want to tightly control the process.
APPENDIX D: “VOICE OF THE CUSTOMER” PERSPECTIVES

During phone interviews and on-site meetings, respondents provided opinions on the topic of EV charging. The consultants do not associate these views to any parent organizations, as they are just opinions. The respondents are not identified, but their comments bring context to the topic of EV charging and readiness in apartment-based housing properties.

- “We have only one hybrid today; I doubt there will be demand here. Nobody asks or talks about EVs; they all have cars from the ’70s and ’80s.”

- “No, we haven’t, because we do not want to instigate the idea or process with our residents. We had a single driver [who] wanted charging and we wanted nothing to do with it, got dragged kicking and screaming to do it. We had to do a lot to get a single L1 outlet.”

- “No, [we] do not want to open up Pandora’s box yet.... [We’re] waiting for reaction to AB 2565.”

- “When we did the installs, it came from me. Going forward it’s going to come from the site because it’s going to be driven by the residents who request charging under AB 2565.”

- “When there is a new development on the boards I always make sure that EV charging is in the schematics.”

- “We have no clear guidance on how to handle ‘reserved for EV-only’ policy yet.”

- “They are not happy with ‘first-come, first-served’. They would like to have a designated EV charge station spot.”

- “I have not tried to charge them to reserve spots yet. The cost to add spots is challenging, so we like ‘first-come, first-served’.”

- “The property owner will make the decision based on financial and ROI factors. My job is to tell him what and why to invest in something. I have three HOAs and their process is very different.”

- “If a request is made, it is reviewed in context of the plan for that building. If we are going to turn the building soon, then we won’t invest in it. If we plan on holding the property for a while, we might consider it. It’s finally up to the owner at each property. We have 40 properties — 50 percent of those are ours alone and 50 percent are joint ventures with multiple partners, so getting approval for site-specific capital budgets is specific to the ownership of the building.”

- “$15K is the minimum threshold for a capital budget item; we are trying in existing buildings to be under that threshold for EV charging. If it’s below that, then ... an area property manager can put up to $3K in their expense budget and they are on a one-year approval cycle. We do not want to spend on capacity upgrades; this was the driver for the relationship with NRG.”

- “[The residents] expect free electricity as a building amenity.”

- “They wanted it to be free but now are paying market rates.”

- “Would like [charging] as a part of the rent, [but] no idea what would be fair. We charge a $300 deposit for pets.”

- “I would like the residents to pay for the charging on their individual station in their garages and not have to bill them for anything. I don’t have a pet fee so I do not think I would have an EV fee.”

- “I would like a turnkey partner so I don’t have to do anything except provide the spaces.”
APPENDIX E: SUMMARY OF EVAT MEETING

Silicon Valley Electric Vehicle Opportunity Initiative (EVOI)
Meeting with California Apartment Association, Tri-County Division (CAA)
San Jose, California
February 26, 2015

Overview and Highlights

Pursuant to its RICOG MUD grant, EVOI convened a meeting with CAA staff and member representatives to better understand apartment owner concerns and perspectives regarding EV charging and to review potential resources for CAA that could ultimately promote EV charging deployment in apartment buildings.

Participants included Lillie Richard, public affairs coordinator of CAA Tri-County, as well as representatives of the following apartment organizations: Avalon Bay Communities (equity REIT developing and managing apartment homes); Sares-Regis Group (property management); Prometheus (private owner of multi-family properties); and Prodesse Property Group (residential property manager). An additional five apartment representatives expressed interest in the working group but were not able to attend. Also attending were EVOI’s MUD consultants, Jim Helmer and John Kalb, as well as Stephen Atwater of Evolvelectric, and Luther Jackson, NOVA program manager.

After hearing a presentation of potential resources from Helmer and Kalb and sharing apartment owner concerns, the CAA representatives agreed to pursue the following actions:

- Establish a CAA working group that meets quarterly and is supported by CAA staff and Jackson.
- Produce a CAA seminar in June 2015 to explain the basics and ramifications of Assembly Bill (AB) 2565.
- Share information with statewide CAA and encourage incorporation of EV charging into statewide curricula.
- Consider presenting the “EV 101” charging overview presentation to members in quarterly seminars and as an archived webinar.

EVOI findings and draft resources and recommendations

Kalb reviewed the results of the EVOI charging survey of CAA members. Only 23 responded out of 3,000. Seven said they would be interested in potentially serving on a CAA advisory group. The survey and subsequent interviews revealed minimal demand for charging from current tenants or prospective tenants. Respondents said that the apartment owner and manager interest level may increase if there were funding available to prepare properties for EV charging.

Helmer suggested that one of the CAA goals should be to persuade the State to shift more money into MUD charging, particularly because MUDs represent such a large underdeveloped market for EV sales. “The State has put a lot of money into public charging and public fleets, but very little into MUDs (to date), because the market hasn’t been there.” (Over 90 percent of EVs and PEVs are sold to buyers in single-family dwellings, yet 34 percent of Californians and 70 percent of San Franciscans live in multi-unit dwellings.)

Based on the EVOI project to date, Kalb and Helmer reviewed a set of key findings and draft recommendations that will be included in their final report.
Finding 1

Apartment property managers and site-based facility personnel do not understand the nuances of evaluating multiple issues and evaluating the systems on their properties for deploying EV charging infrastructure. Further, they rarely are asked to create business strategies and have limited authority to undertake projects. They generally are providing information to higher levels of property management or owners.

Recommendation 1

Provide basic “EV Deployment” guides for MUDs. Focus on developing usable checklists and guides that can assist a self-directed site manager through a detailed property and electrical assessment review as well as the development of a site-based charging scenario plan.

Finding 2

Apartment property owners are not investing in EV charging projects due to a lack of perceived demand by residents, incomplete project planning, unknown and potentially significant capital costs, complex ownership decision-making models, and most importantly, no realistic business model that fits with their existing business criteria. With little or no interest to invest in EV charging infrastructure improvements, there is even less interest in paying for the electrical, parking and business assessments, and the resident surveys required to plan and make decisions.

Recommendation 2

A tiered state-funding program should be put in place that:

1. creates standardized accredited curriculums for MUD EV infrastructure assessments and business planning;
2. trains and certifies a workforce that has completed the accredited curriculum; and
3. provides grants to pay the cost of the trained workforce to conduct EV assessments for MUD properties.

Finding 3

Property improvement upgrades, building renovations, providing amenities for all residents, and capital maintenance expenditures are the top priorities in annual budget decisions made by MUD owners. The availability of EV charging infrastructure grants would significantly increase the likelihood of property owners undertaking EV charging projects given their budget constraints.

Recommendation 3

The State should establish a capital improvements (cost sharing) funding program for MUD property owners who have utilized certified assessors to plan and design projects and who have a business model in place at the time of grant approval.

The CAA representatives present said they were in support of the recommendations. They suggested that apartment building maintenance technicians and other current employees who are familiar with the properties could form the pool from which the assessment trainees are selected.
Apartment owner/manager considerations, concerns, and current practices

There was a discussion about liability issues raised when apartment building chargers are open to non-residents. The Avalon Bay representative said 99 percent of their chargers do not offer public access. He also said that residents with EVs want dedicated chargers for their use.

The Prometheus representative said their properties offer some charging to non-residents. The resident charging stations are not dedicated to individuals. This is the so-called “hotel approach.” She said residents would prefer dedicated chargers to the hotel approach.

At a Prometheus Denver location, every tenant has one assigned parking spot. If they have an EV, they can pay extra to rent an extra spot for dedicated charging. When the dedicated charging spots are full, there is a waiting list.

An Avalon Bay property in San Francisco sets aside eight parking spaces that are EV-ready. “We ended up renting them to standard vehicle owners. When an EV owner comes along, they are put on a waiting list for one of the eight spaces.”

Regarding the challenge of smaller properties being able to offer charging, the Prodesse representative said that “it would be nice to have a charging station on the street near the leasing office. We would pay some of the cost for charges at the street. It’s a way to get a lot of smaller owners [who are more interested in charging]. You’re not giving up a space [on the property] when you are already impacted.”

While the market for EV charging is currently slow, there was a consensus that the advent of the Chevrolet Bolt in 2017—with a 200-mile battery range and a price of $37,500 before incentives—could sharply increase tenant demand for EVs and EV charging.

EVOI Draft Resources for CAA Consideration

Kalb and Helmer led a review of a draft “EV 101” Powerpoint designed as an education resource for a CAA working group and staff to share with CAA members. The CAA representatives had the following comments:

- The ADA discussion needs to be clarified to reflect the nuances of the law. One representative suggested that the CAA share this information with members and perhaps include sample wording.
- Representatives said that EV 101 is comprehensive but could be overwhelming for those with no familiarity with EV charging. Opportunities to make the information more accessible could include:
  - presenting an awareness seminar for AB 2565 to introduce the topic of EV charging, then present the rest of the EV 101 information in chunks as CAA members gain more knowledge;
  - presenting a quarterly seminar on EV 101 with Kalb and/or Helmer to explain the slides;
  - creating an EV 101 webinar that would be archived for ongoing use;
  - asking the statewide CAA to create a subcommittee on EV-charging that is populated by people who are passionate about this issue; or
  - creating a separate document on how to implement AB 2565.

The CAA representatives did not think it would be effective for them to act as EV charging mentors to their colleagues. A better approach would be to assign the mentoring task to the individuals who would be trained to assess properties for EV charging readiness.

On the whole, the representatives applauded the availability of more educational resources. Said one: “There is a risk that [a tenant citing AB 2565] would come up to a property manager and assert their rights, and the manager would say, ‘No, you can’t do that. That’s our property’.”
Next Steps, Roles, and Responsibilities

- Establish a CAA EV charging working group with quarterly meetings that are supported by CAA staff and Jackson from NOVA. Purpose of the meetings will be to share best practices and review and disseminate charging information to the CAA membership.

- Richard from CAA staff will coordinate with the Prodesse representative to approach statewide CAA to amend the existing curriculum to include EV charging.

- CAA will produce a forum in June to discuss the impacts of AB 2565. CAA will consider contracting with Kalb and Helmer to lead the class.

- Richard from CAA staff will reach out to statewide CAA to spark a more robust statewide discussion of EV charging issues, including Southern California representatives.

- CAA and EVOI will explore strategies for implementing the recommendations cited above.

APPENDIX F: EV 101 FOR MULTI-UNIT DWELLINGS

This document can be accessed online at: link.novaworks.org/ev-mud.
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