



**Act 164: Hawaii Multi-Unit Dwelling EV Charging Working Group
October 1, 2015 Meeting Summary**

Date: Thursday, October 1, 2015

Time: 9:00 AM – 12:00 PM

Place: State Office Tower, Room 1401, 235 South Beretania St, Honolulu, HI 96813

Working Group members in attendance

- Luis Salaveria, Director of Business, Economic Development, and Tourism
- The Honorable Rosalyn H. Baker, Chair of the Committee on Commerce and Consumer Protection of the Senate
- Matthew K. Yoshida (Representing The Honorable Angus L.K. McKelvey, Chair of the Committee on Consumer Protection and Commerce of the House of Representatives)
- Angela Thomas, (Representing The Honorable Lorraine R. Inouye Chair of the Committee on Transportation and Energy of the Senate)
- Catherine P. Awakuni Colón, Department of Commerce and Consumer Affairs
- Jeffrey Ono, Division of Consumer Advocacy (Representing Sherri Sakamoto, Division of Consumer Advocacy)
- Na Lan, Community Associations Institute
- Phil Nerney, Community Associations Institute
- Shem Lawlor, Hawaii EV Partnership
- Todd Ritter, Hawaii EV Partnership
- McKibben Mist, Building Industry Association of Hawaii
- Michael Colon, Hawaiian Electric Company

Other attendees

- Gregg Kinkley, Deputy Attorney General
- Jo Ann Uchida, Department of Commerce and Consumer Affairs
- Bedyne Stone, Department of Commerce and Consumer Affairs
- Neil K. Fujitani, Department of Commerce and Consumer Affairs
- Gladys Marrone, Building Industry Association of Hawaii
- Matt Prellberg, Legislative Reference Bureau
- Terrence Lee, Legislative Reference Bureau
- Charlotte Carter-Yamauchi, Legislative Reference Bureau
- Chad Atkins, Boss Energy Technologies
- Creighton Liu, Hawaiian Electric Industries
- Carlos Perez, Hawaiian Electric
- Jimmy Yao, Hawaiian Electric
- Mark Yamamoto, Hawaiian Electric
- Eric Shimono, Hawaiian Electric
- Dean Pang, City & County of Honolulu, Department of Planning and Permitting
- Mark Glick, Hawaii State Energy Office
- Chris Yunker, Hawaii State Energy Office
- Lynda Viray, Hawaii State Energy Office
- Margaret Larson, Hawaii State Energy Office
- Kent Fukuhara, A-1 A-Lectrician, Inc.
- Wes Wada, EV Driver

Call to order. Welcome and Introduction

The first meeting of the Act 164 Working Group convened at 9am on October 1, 2015 in conference room 1403 of the State Office Tower. The meeting agenda, a list of Working Group members, a copy of the legislation, and a sign-in list from the meeting were handed out and are attached to this document. The Working Group meeting was open to the public and several non-Working Group members attended.

Mr. Luis Salaveria, Director, DBEDT opened the meeting with a statement of objectives, State energy goals, and general remarks on conduct of the meeting. Mr. Gregg Kinkley, Deputy Attorney General, reviewed the roles and responsibilities of Working Group members and their obligations under State laws and regulations, including the Sunshine Law.

Working Group Strategy

Mr. Mark Glick, Administrator, Hawaii State Energy Office (HSEO) discussed the Working Group strategy. The strategy DBEDT is proposing to facilitate approximately 3-4 half day Working Group meetings beginning October, 2015, ending November, 2015 before Thanksgiving. The meetings will provide a venue to present and exchange information regarding the EV industry, including examining challenges and solutions pertaining to EV charging station installations in MUDs. The first meeting will focus on introductions, and education- information exchange. The second meeting will present an opportunity to share new information/data, and hear from guest speakers, requested in the first meeting. Foremost the second meeting will be a solution focused discussion to determine a working agreement of recommendations, including any proposed legislation(s). Between the second and third meetings, DBEDT and the Legislative Reference Bureau will begin developing a draft report capturing the Working Group's findings and recommendations, including any proposed legislation. Per the legislation, the Legislative Reference Bureau shall assist the Working Group with its final report to the legislature and prepare any proposed legislation. The goal of the third meeting is to establish a working agreement on the report and its recommendations.

Working Group Introductions.

Working Group members and non-Working Group members introduced themselves by stating their interest and objective on EV charging in MUDs.

Member Presentations

Working Group members and industry representatives presented information critical to the Working Group discussion. Information was presented by HSEO, Hawaii EV Partnership, Hawaiian Electric Company, CoStar Group, Inc., Boss Energy Technologies, and A-1 A-Lectrician, Inc. Powerpoint slides (HSEO, Hawaii EV Partnership, CoStar Group, Inc) will be publically available on the HSEO office website, <http://energy.hawaii.gov/testbeds-initiatives/ev-ready-program/laws-incentives>

HSEO

Chris Yunker, HSEO Energy Systems and Planning Program Manager led a presentation which provided an overview of Hawaii's EV industry, EV technologies including the challenges of installing EV charging in MUDs. Summary of Talking Points:

*Act 164: Hawaii Multi-Unit Dwelling EV Charging Working Group
October 1, 2015 Meeting Summary*

- The past year marks a turning point in the history of energy in Hawaii. Since the establishment of the Hawaii Clean Energy Initiative in 2008, the state has been moving from fossil fuels to clean energy sources. Building on tremendous progress in recent years, this year the state accelerated its commitment to an unprecedented level: 100 percent renewable energy by 2045.
- As additional renewable electricity is added to Hawaii's grids, the state will have the capacity to power the widespread deployment of EVs. EVs have the potential to dramatically reduce fossil fuel dependency and help Hawaii attain a more stable, modern electrical grid. A very important sector for the adoption of EVs and deployment of EV charging stations in Hawaii are multiple unit dwellings. EV charging stations would likely encourage further EV adoption which will assist clean energy goals.
- State of Hawaii defines an EV as any plug in electric vehicle (EVs and PHEVs) on the market today.
- The International Council on Clean Transportation's Hawaii Clean Energy Initiative Transportation Energy Analysis baseline, shows sales of EVs increase to account for one in ten vehicles sold in 2030 (resulting in 43,000 EVs on the road). The overall current trend is encouraging and indicates meaningful progress has been made by statewide actions.
- September 2015, the number of EVs in the state was 3,750, an increase of 829 (28.4%) from the same month last year, and an increase of 61 vehicles (1.7%) from August 2015. To put into context, as of September 2015, there were 1,035,653 passenger vehicles in the State. EVs make up 0.36% of all passenger vehicles. 425 EV charging ports across the State. 12 EV models available statewide.
- Installing EV charging stations in MUDs is challenging due to variety of issues, including but not limited to: installation costs, electrical capacity, parking availability.
- Numerous States, Counties, Cities, and Utilities across the United States are examining and implementing policies, incentives and other solutions to address EV charging in MUDs.

CoStar Group Inc.

Mike Perkins, Account Executive, Hawaii CoStar Group, Inc./LoopNet, was invited to present Hawaii MUD industry data. Summary of Talking Points:

- Under The Costar Group umbrella with their market-leading products: Costar, Apartments.com and Loopnet.com; these resources combine to provide an unprecedented level of market knowledge on all commercial and multifamily properties throughout the country.
- The integration of the online marketing tools and field and phone researchers provide information on properties ranging from the physical aspects of the property to vacancies, lease rates, market statistics and verified and researched sales comps. Additionally, our researchers identify contact information for true owners of the individual properties (digging

behind the LLC's) to provide for more effective and efficient means to contact property owners.

- With respect to the EV pursuits, the ability to refine searches to identify primary targets, age/type of construction, number of parking stalls, number of units, proximity to certain demographics, etc., could make Costar an ideal tool to identify high probability assets that could utilize the service and help you most effectively get you in contact with decision makers.

Apartment Properties

County	Unit Count	Number of Communities	Average Age
Hawaii	4064	55	1968
Honolulu	46242	2308	1961
Kauai	507	15	1979
Maui	2777	76	1977

Condominium/Co-Op Properties

County	Unit Count	Number of Communities	Average Age
Hawaii	1768	20	1975
Honolulu	72526	746	1974
Kauai	544	7	1983
Maui	3369	36	1986

Hawaii EV Partnership

The Hawaii EV Partnership, represented by Todd Ritter, EV Structure and Shem Lawlor, Blue Planet Foundation's Honolulu Clean Cities presented challenges to EV charging in condos and examples from mainland installations. Summary of Talking Points:

- Most multifamily properties built in 1970,'s 80's, 90's and 2000's have limited transformer and load capacities to handle multiple EV charging stations in its parking structures. Out of 1200 buildings EV Structure has seen, mostly on the U.S. mainland, an average can handle 6 EV charging stations. EV Structure mentioned capacity constraints presents electrical infrastructure unexpected issues requiring new electrical infrastructure and transformer load assessments before any future permissions are given to install EV charging stations.
- Parking availability and electrical capacities are primary factors affecting whether or not charging stations can be installed in AOAO's. Most developers have not accommodated for EV growth and did not incorporated extra parking spaces with electrical receptacles, or level II charging station make ready into their building designs and construction.
- This dynamic complicates the process of determining which party should pay the costs associated with the installation and purchase of new electrical equipment for upgrades.
- Additional insurances naming the common area development as additionally insured, payments for the installations, necessary electrical upgrades and common area KWH usage, the equipment ownership is not always clear.
- The building management may be skeptical of allowing installation of charging stations along with taking ownership of a common area charging unit for fear management would bear

responsibility for maintaining and decommissioning the units at the end of its useful life.

- It might be perceived as unfair for the AOA to pay for the installation, upgraded electrical equipment, (i.e. new Switch Gears, panels, transformers and maintenance) since the amenity will only be useful to EV drivers. However, other expensive building amenities, such as a gym, pool or other amenities, similarly do not serve the entire population, but rather just the residents who choose to use them.

Hawaiian Electric Company

Hawaiian Electric, represented by Working Group member Michael Colon, presented Hawaiian Electric's roles and responsibilities pertaining to EV charging stations in MUDs.

Summary of Talking Points:

- Under current practice, if the existing utility transformer is insufficient due to an increase in load demand, the utility will cover the expense for the upgrade. The cost for the upgraded transformer would be borne by the company and is subject to recovery through rates. This however, does not include any upgrades to the transformer pad, ducts or vault room which are the responsibility of the customer to provide at their expense. Most large condos have their own dedicated transformers, except for some smaller apartments which may have a system transformer on the street (i.e. overhead).
- The Company is open to exploring the possibility of submetering for individual customers. In addition to the equipment and logistical issues at the customer location, submetering would require modifications and updates to the Company's billing and metering processes and procedures, which would most likely result in additional expense to the utility. Similarly, any additional incurred costs related to modifications would be subject to utility cost recovery as well
- Electricians generally contact Hawaiian Electric to ensure there is adequate - circuit capacity to accommodate the increased electric load. If there is a need to increase circuit capacity, including transformer upgrades, then Hawaiian Electric would take the lead and make upgrades. However, large-scale circuit upgrades, such as substation improvements and/or reconductoring can take longer (potentially 1-2 years for a substation upgrade).
- Planning is important to understand future of EV adoption, what's "coming down the pipe." Hawaiian Electric is interested in exploring where the Company can assist in meeting the infrastructure needs to accommodate increased EV adoption, particularly as it pertains to larger system integration.
- It is important to point out that, unlike PV, EVs can be considered a smart load, which can potentially influence the grid. Planning and knowing ahead of time where EVs will be located makes it easier to determine if circuit upgrades may be needed upstream. Currently the industry as a whole is in the early planning stages and therefore Hawaiian Electric can make adjustments.
- Hawaiian Electric would like to understand where the greater number of charging units would be located as well as where the need would be best met from a customer perspective. Part of

load planning may rely on EV load in the future.

- Hawaiian Electric recognizes that workplace charging is an opportunity to create synergies between daytime renewable energy production and EV charging load.

Boss Energy Technologies

Chad H. Atkins, LEED AP, Boss Energy Technologies was invited to share information/experience from an electrical contractor's point of view, highlighting the key issues to installing EV charging stations in MUDs. Summary of Talking Points:

- Electrical Capacity is the # 1 shortfall for MUD installs. AOAOs want to be fair so if they can provide for one, they could provide for all, but this is not the case in 90% of MUD- the 10 percent being the ones with their electrical meter close by their parking space.
- Over the last five years, Boss Energy Technologies has conducted site surveys for over 30 MUDs ranging from townhomes to high-rise condos. Boss Energy Technologies has only provided proposals in 14, and only 5 successful installations.
- Common area charging stations can be a challenge to accommodate because physical space, parking spaces to set aside, and space for the equipment to obtain added electrical capacity is just not there in most scenarios. Boss Energy Technologies believes the price to upgrade the capacity, would never get votes from the AOAO unless they had extra funding.
- Mr. Atkins applaud the MUDs that allow EV drivers to move forward.
- Estimates charging station infrastructure installation to cost anywhere from \$3k-\$5K.
- Estimates consultant fees could cost \$3k-\$4k- which is in addition to the charging station infrastructure installation costs.
- Challenge of MUD charging station installation includes limited interest by workforce due to project complexities- contractors and engineers are hesitant to get involved in MUD EV charging projects, however these projects require a licensed engineer to stamp and sign.
- Coupling means for Level 1 and Level 2, charging stations. Advises Working Group to pay special attention to terms, charger/ connector (car), coupling (receptacle- station).

A-1 A-Lectrician Inc

Kent Fukuhara, Service Engineer, A-1 A-Lectrician, Inc. was invited to share information/experience from an electrical contractor's point of view, highlighting the key issues to installing EV charging stations in MUDs. Summary of Talking Points

- Important to differentiate Switchboards and switch gears (i.e., Hawaiian Electric upgrades transformer, AOAO upgrades switch gears). The following picture shows a switchgear which consist of breakers that can be removed by a racking system. These are the most expensive type of electrical equipment since breakers can be removed and swapped out without turning off the entire electrical system that is energizing the switchgear. If HECO upgrades their transformer, the switchgear would also need to be changed to match the new ampacity rating of the

transformer. The switchgear is on the customer's side of responsibility. HECO is only responsible for the transformer side and is built according to an electrical engineers design for the required capacity for the condominium.



- The following picture is that of a switchboard which has breakers that are bolted onto the equipment and to replace breakers. The entire electrical system would need to be turned off in order to unbolt breakers safely. This is the majority of equipment installed in buildings due to costing. The same rule applies for the switchboard as to HECO's responsibility and the electrical engineers responsibility.



- The following picture shows a switchboard with fuses installed instead of breakers. Older buildings have this type of design.



- The following photos shows a Distribution Panel which a majority of condominiums have which consist of molded case breakers for specific areas and panels. This would be the other equipment that any EV charging stations would get power from since a specific panel for EV charging stations could be installed from this point in the electrical system.



- A power recording/ feeder and service studies, (NEC section 220), is commonly a 30 day power recording period can cost \$1500 - \$2500. PER NEC Article 220.87 exception for “Determining Existing Loads” If the maximum demand data for a 1 year period is not available, the calculated load shall be permitted to be based on the maximum demand (measure of average power demand over a 15 minute period) continuously recorded over a minimum 30day period using a power recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. Based on 220.87 exception the cost can run higher than the normal costing of \$1500 to \$ 2500 up to \$3500 with all the data that has to be interpreted and put into a 30-day period report for the electrical engineer.
- Notes older buildings do not always have extra electrical capacity for EV charging stations. As an old building they were not designed for new technology. During Mr. Kent Fukuhara 16 years of conducting electrical audits, he has noted the older buildings capacity may not be able to handle the new loads required for EV charging stations. The older systems were not designed for the newer technology and caution needs to be taken if additional loads are installed and the effects it can have on the overall electrical system for the building.
- It could cost \$3K-\$6K for an energy audit. It is important to identify who would be responsible for the cost burden. Reserve study is required by insurance companies to be conducted 1-3 years. The study generally looks at switch gear. (Electrical Audit). Energy Audits or Electrical Audits cost can vary based on the size of the buildings electrical system. They can start from \$3000 to \$6000 to do. Some buildings are required to do this based on insurance requirements at a 1 or 3 year interval but every building is different into who will pay for this audit. In general, this is done under the guidelines of “building maintenance” and is paid by all residence in the condominium under the association’s budget. This audit involves infrared, ultrasonic testing with voltage and current testing and a report on findings.
- Problems that are found from electrical audits are in the switchgear and switchboard side. Problems are general not found on the transformer side and this usually is the responsibility of HECO to maintain. The customer’s side is where there are loose connections and faulty breakers and damaged electrical equipment from not maintaining the electrical system.
- Charging stations locations will greatly impact cost when you look at where the electrical power has to come from and to how far the charging station is. In an open parking lot at ground level, trenching will become more than likely a requirement and can cost anywhere

from \$3000 to \$10,000 depending on how far you have to go. Every building is different, trenching is dependent on where charging station is located.

- Example in a MUD that has between 200-400 charging units, if the building only has 2 EV drivers, who would cover the cost? Who would be responsible for paying for the installation, etc? In most cases generally this would fall to the community association. Would the association be ok with paying for all this cost? Highly unlikely since it puts certain residence in a special interest group and this would not be fair for the rest of the residence in the building. Customer side is where most of the issues are (switch gear).
- There is an opportunity in new buildings to add in charging station infrastructure. Greater opportunity to design for EV Charging Stations before the building is up (built). Putting EV charging stations into the initial design of new buildings is the best option to go by. The infrastructure is easier to be done during the initial construction. 801 South Tower - A parking structure has commercial and residential parking. There is one dual EV charging station in the commercial parking space and there are provisions for 12 parking stalls for the residential parking spaces ready to hookup EV chargers. If a dedicated transformer was designed into the construction of a project, it would make the parking garage suitable for expansion of EV chargers. The cost would be something that would need to be considered since it still would cost money to the developer.
- It is important to utilize licensed electricians as liability is the biggest issue. All electrical work needs to be done from a state licensed electrician and electrical contractor in the state of Hawaii. This is only way to avoid liability issues if something happens. An electrical engineer is needed in order to draw up plans to submit to the Department of Planning and Permitting to be in compliance with the City & County rules which will require an electrical inspector to inspect the work that was done and then sign off on the permit as complying with the NEC on installation. An electrical engineer could draw up plans on the installation of all associated electrical infrastructure according to the NEC. Electrical system installers are required to work off of approved electrical plans designed by an electrical engineer, and also are required to have city electrical inspectors approve what is installed. Liability is the biggest issue that an electrical contractor has to avoid to maintain being in business. This is done by following an electrical engineers approved plans by the city and approved inspection of the electrical system by the city inspector after the work is completed. Liability is something that condominium associations need to be concerned about and keep a very low level of liability by doing things the right way. Correct procedures are not an option but a requirement.
- Important to evaluate the data overtime. For example if there is a plan to install charging stations on a 50amp that capacity may only be available at that point in time, does not take into consideration other activities by condo. This is a very important issue that needs to be considered. So the most important thing is to know after a power recording was done is if there was any electrical work done after the testing was done. If a long period of time has passed, the data may not be useable information since a long period of time has passed. If this happens, then another power load study would have to be done to assure that there is still ample capacity to add EV charging stations.
- The NEC assumes that the EV charging station load is a 24/7 load and cannot be considered an intermittent load. All loads are considered constant since there is no real pattern to an individual's habits or routine as to when they will be charging their EV. This is stated in the NEC Article 625.41 Rating: (Electric vehicle supply equipment shall have sufficient rating to

supply the load served. Electric vehicle charging loads shall be considered to be continuous loads for this article.) Where an automatic load management system is used, the maximum electric vehicle supply equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system. This is easier explained as (Connection of EV supply equipment to automatic load management system can preclude the need for a service or feeder upgrade to an existing electrical system.) This is meant for small additional EV charging stations and not for larger volumes of chargers installed in a building usually limited to 1 to 3 chargers.

Next Steps

Mr. Luis Salaveria, Director, DBEDT facilitated a short discussion which emphasized the numerous challenges to installing EV charging stations in MUDs, and highlighted the next meeting will be focused on solutions. Some of the issues briefly discussed included:

- Importance of ensuring fairness to other tenants (i.e., cost of installations, cost of electricity consumed)
- Importance to recognize there are two issues the Working Group should consider: 1) installing charging station as a common element, and 2) installation of a single unit / owner /private charging station which is exclusive as their own use.
- Consideration of building daytime electric load to match renewable energy availability
- Consideration of planning/matching incremental condo growth, electric vehicle adoption forecast/demand, and EV charging station demands
- Consideration of deployment of alternative EV charging station locations (i.e., public charging, workplace charging, development of “EV gas stations” utilizing fast chargers)
- Request for Hawaiian Electric and HSEO to provide update on public charging program and locations

The HSEO asked the group to submit feedback on missing data and perspectives which would aid in further discussion to Margaret Larson, Energy Analyst, margaret.s.larson@dbedt.hawaii.gov

Adjourn

Mr. Luis Salaveria, Director, DBEDT closed the meeting at 12:00p.m.