



68476

DATE: August 15, 2013

TO: Housing, Land Use, Environment, and Transportation Committee (HLUET)

FROM: Ignacio Gonzalez, Director

SUBJECT: Electric Vehicle Chargers - Report back from May 21, 2013 Board Referral

RECOMMENDED ACTION

Accept report and consider recommendations from the Department of Planning and Development regarding preparation of an Ordinance requiring the installation of electric vehicle chargers or pre-wiring in new construction and rebuilds in unincorporated Santa Clara County. (Referred from May 21, 2013 Board of Supervisors meeting, Item No. 8)

FISCAL IMPLICATIONS

There are no fiscal impacts to the General Fund as a result of this action.

CONTRACT HISTORY

Not applicable

REASONS FOR RECOMMENDATION

- (1) This report provides a response to the May 21, 2013 Board referral requesting that the County update building codes to require that all new construction and rebuilds of existing construction be installed with pre-wiring necessary to install electric vehicle chargers.
- (2) This report includes (a) research regarding plug in electric vehicles and electric vehicle charging requirements by the State and other jurisdictions in California (b) the recommended policy approach by the Administration to modify County Ordinances to require that new buildings and rebuilds install pre-wiring or charging systems for electric vehicles, and (c) a proposed schedule for completing public outreach and coordinating with other cities in the County before returning an Ordinance to the HLUET Committee and the Board of Supervisors for adoption.

(3) The May 21 Board referral also requests a policy to require the installation of electric vehicle chargers during parking lot projects at County facilities. A response to this referral will be made to the Board's FGOC Committee in September, 2013, by the Fleets and Facilities Department staff.

Research regarding Electric Vehicle Charging Requirements

Department of Planning and Development staff conducted research regarding plug-in electric vehicles (availability, market trends, charging technology), current requirements by the State to install electric vehicle charging systems, and requirements of other jurisdictions in California for the installation of electric vehicle charging systems in new buildings.

Research findings are outlined in the Background section of this report and within Attachments 2, 3 & 4.

Summary of the research is as follows:

- Plug-in Electric Vehicles (“PEV”) are vehicles that can operate on battery power and are recharged from the electrical grid. PEV’s consist of Battery Electric Vehicles (“BEV”), such as the Nissan Leaf, that only use electricity and currently have a range of approximately 50-100 miles, and Plug in Hybrid Electric Vehicles (“PHEV”), such as the Chevy Volt, that use both electricity and a gas motor and typically have an electric range of 10 to 40 miles.
- The availability of PEV’s is growing and will continue to expand over the next several years. The International Energy Agency projects that PEV’s will account for up to 15% of the vehicle fleet globally by 2020.¹
- An important factor for those considering purchasing PEV vehicles is the availability of PEV charging systems within the region to avoid “range anxiety”, the perception that a vehicle can meet the owner’s transportation needs with a reliable source of power nearby.
- PEV charging systems consist of AC Level 1 Chargers, AC Level 2 Chargers, and Level 3 / Fast Chargers. Level 1 Chargers consist of a standard 120 volt outlet and can charge a PEV in 5 to 20 hours. Level 2 chargers provide 240 volts and can charge a car in 4 to 7 hours. Level 3 / Fast Chargers (or “DC Fast Chargers”) provide approximately 400 – 500 volts and can charge a car in as little as 15 minutes. While Class 1 and 2 chargers are widely available, the DC Fast Chargers are still limited in availability.

¹ Ready, Set, Charge, California. Bay Area Climate Collaborative. November 2011
Board of Supervisors: Mike Wasserman, Cindy Chavez, Dave Cortese, Ken Yeager, S. Joseph Simitian
County Executive: Jeffrey V. Smith
Agenda Date: August 15, 2013

- Governor Brown issued Executive Order B-16-2012 in March 2012 that sets milestones for the availability of PEV's and charging systems between 2015 and 2025. The Executive Order projects that over 1.5 million PEV's will be on the California roadways by 2025.
- There are several other State laws that directly or indirectly support PEV's. This includes the Low Carbon Fuel Standard, consumer rebates for purchasing PEV's, tax exemptions for PEV equipment (SB 71), and PEV access to Carpool Lanes (SB 535, AB 2405).
- The State Building Code does not contain any mandatory requirements for PEV charging systems in construction, but the Green Building section (Cal Green) of the Code includes voluntary measures listing standards for PEV wiring in buildings.
- Several municipalities in California, including the City of Los Angeles and Sunnyvale, have adopted codes and ordinances requiring new buildings to install pre-wiring for PEV charging systems.
- Within Santa Clara County, only the city of Sunnyvale has an ordinance requiring PEV charging systems within new buildings.

Recommended Policy Approach for requiring Pre-Wiring or Chargers in New Buildings and Rebuilds in Unincorporated Santa Clara County

The Administration is proposing that the County use a tiered approach in requiring either pre-wiring for charging systems or the installation of chargers at the time of new construction.

The proposed ordinance would incorporate the "pre-wiring" requirements identified in Cal Green but also include a requirement to provide sufficient capacity to serve the additional electrical load of a future level 2 charging system when calculating the electrical service load demands (panel size) in new construction. Applicants would be encouraged to evaluate means of balancing electrical load requirements between different uses in the house, such as incorporating methods of charging during periods when electricity demands in the rest of the house are at their lowest.

The proposed policy approach would require the following:

New single family homes, multi-family residential of less than 10 units, small non-residential (<100 parking spaces) - Required to be pre-wired with conduit between the electrical panel and parking area and provide sufficient capacity in the onsite electrical service to accommodate a future Level 2 charger.

Large non-residential (>100 parking spaces) and multi-family residential buildings of 10 or more units) – Required to install Level 2 chargers at the time of construction to dedicated PEV charging / parking spaces, comprising 5% of total parking spaces.

Non-residential includes commercial, office, industrial, and institutional buildings.

The requirement to install PEV charging systems at the time of new construction for large non-residential and higher density residential buildings supports the regional need to make PEV charging systems visible and available (as part of a network) to encourage PEV ownership. Larger non-residential buildings (commercial, office, industrial) would have many employees or customers that would seek to rely upon the availability of Level 2 chargers. The amount of chargers and parking spaces dedicated to PEV’s (5%) is modeled after Los Angeles’s PEV Ordinance.

Only pre-wiring is recommended for new single family residences, low density multi-family

Municipality	Building Type	When code applies	Level Required	Conduit Required	Wiring/outlet Required	Panel Capacity Required	PEV Parking Spaces
Santa Clara County	One & two family dwellings	New building & rebuilds	Level 2 (208/240 V, 40 amp)	Yes	No	Yes	none
	Multifamily dwellings (less than 10 units)	New building	Level 2 (208/240 V, 40 amp)	Yes	No	Yes	3% of total parking
	Non-Residential (<100 parking)	New building	Level 2 (208/240 V, 40 amp)	Yes	No	Yes	5% of total parking
	Multifamily (10+ units) & Non-Residential (>100 parking)	New building	Level 2 (208/240 V, 40 amp)	Yes	Yes	Yes	5% of total parking

residences, and smaller non-residential buildings as PEV ownership and the type of charger system used would depend upon the personal preference of a future resident or business owner. Installation of the conduit and additional capacity would future residents to install a PEV charging system without the need for an expensive retrofit to existing construction and the electric service.

Rebuilds – The recommended ordinance would require that rebuilds of single family homes that include construction between the electrical panel and parking space, or that includes an upgrade to an electrical panel, be required to install conduit or electrical capacity for a PEV system, respectively. For example, if a resident was to complete an extensive rebuild of their

house that affected the walls between an electrical service and the garage, they would be required to install a conduit.

For multi-family and non-residential buildings, the Administration does not propose including a conduit installation requirement for rebuilds / remodels. This is in consideration of the greater number of variables and uncertainties regarding the location of parking and electric panels in these types of buildings, making the requirement to install PEV systems less feasible. However, if a non-residential building was to be demolished and rebuilt, the PEV installation requirements would apply.

Proposed Outreach and Schedule to Return Final Ordinance to HLUET Committee and Board for Adoption

Following review and policy direction from HLUET and the Board of Supervisors on these recommendations, the Administration proposes conducting public outreach and subsequently returning an Ordinance to the HLUET Committee and Board of Supervisors for review and approval.

Public Outreach would occur in September and October and include meetings with applicants (engineers, architects) and developers, industry representatives, and other stakeholders such as agricultural interests, environmental groups, and representatives of Stanford University.

Department staff also intends to meet with staff from the cities in Santa Clara County to discuss existing or proposed requirements to install PEV chargers in those jurisdictions. An objective of this coordination would be to determine if a proposed Ordinance by the County could act as a model Ordinance that could be adopted by each of the cities in the County. As part of this effort, Department staff would also explore means of standardizing and streamlining the PEV charger permitting process between different jurisdictions in the County. This could entail training and / or the creation of a standardized checklist / permitting process for PEV chargers.

IMPACT STATEMENT

CHILD IMPACT

The recommended item will have no / neutral impact on children.

SENIOR IMPACT

The recommended item will have no / neutral impact on seniors.

SUSTAINABILITY IMPACT

The recommended item furthers the Board of Supervisors' sustainability goals to facilitate the shift in a regional vehicle fleet from automobiles that use conventional gasoline

engines to vehicles that use electricity, resulting in less reliance upon non-renewable fossil fuels and on overall reduction in the creation of vehicle emissions and pollutants.

BACKGROUND

On May 21, 2013, the Board of Supervisors referred to the Administration a request to update County Building Codes to require that all rebuilds and new mixed use, residential, commercial construction in unincorporated Santa Clara County include the pre-wiring necessary to efficiently install electric vehicle chargers. The referral also included a request to the Administration for a policy to be drafted to require the installation of electric chargers during parking lot projects at County Facilities.

Department of Planning and Development Staff conducted research regarding plug in electric vehicles (availability, market trends, charging technology), current requirements by the State to install electric vehicle charging systems, and requirements other jurisdictions in California for the installation of electric vehicle charging systems in new buildings.

Plug in Electric Vehicle – Past Publications

There have been many guidebooks and publications distributed describing Plug In Electric Vehicles and regional charging station infrastructure requirements. This includes the draft “*Zero-Emission Vehicles in California: Community Readiness Guidebook*” authored by the State Office of Planning and Research (2013), “*Ready, Set, Charge, California!*” by the Bay Area Climate Collaborative www.baclimate.org/impact/evguidelines, and the “*Bay Area and Monterey Area Plug in Electric Vehicle Readiness Plan*” by the Bay Area Air Quality Management District <http://www.baaqmd.gov/Divisions/Strategic-Incentives/Bay-Area-EV-Ready>.

Glossary of Terms used with Plug in Electric Vehicles

- PEV – Plug in Electric Vehicles
- BEV – Battery Electric Vehicles that are exclusively powered by batteries. Includes cars such as the Nissan Leaf
- PHEV - Plug In Hybrid Electric Vehicles – combine a plug in batteries with a gas motor. Includes cars such as the Chevy Volt
- ZEV – Zero Electric Vehicles – includes both BEV and Hydrogen Fuel Cell Electric Vehicles. .
- EVCS - Electric Vehicle Charging Station - a public or private parking space that is served by battery charging station equipment that has as its primary purpose the transfer of electric energy (by conductive or inductive means) to a battery or other energy storage device in a plug-in electric vehicle.

Availability of PEV and anticipated increase in Market Share

Currently all major automobile manufacturers are developing PEV's as part of their vehicle fleet. There are a number of different PEV's available for purchase today, including the Chevy Volt (PHEV), Ford Focus Electric (BEV), Ford Fusion Energi (PHEV), Mitsubishi "i" (BEV), Nissan Leaf (BEV) Toyota Plug in Prius (PHEV), and the Tesla Model S (BEV).

Forecasts for PEV growth vary widely. Within California, the California Air Resources Board projects PEV ownership rates of approximately 5% of new car sales by 2020. The International Energy Agency projects penetration rates of nearly 15% globally by 2020

Environmental Benefits of PEV's

Reduction of Emissions

Plug in Electric Vehicles obtain either all or a majority of their energy from the electrical grid, as opposed to an on-board gasoline engine. The amount of reduction in the emission of pollutants or emissions associated with the use of PEV's thus depend upon the energy sources used in the electrical grid to supply power to PEV's. Within Santa Clara County, the majority of electrical power is supplied by Pacific Gas and Electric. Per Executive Order S-14-08 and SB X1-2, California's Electrical Grid, including power supplied by Pacific Gas and Electric, is mandated to obtain 33% of all energy from renewable resources by 2020. Under this transformation, California's grid is expected to have 40% lower emissions than in 2008, due in large part to an increase in near-zero carbon renewable generation from 11% to 31%. This will reduce grid carbon emissions from 447 grams/CO₂ per kWh to 261 grams/CO₂ per kWh.

Thus BEV and PHEV using energy from the electrical grid create emissions that are substantially lower in comparison with a conventional gasoline powered vehicle. BEV emissions are estimated by the California Air Resources Board to be 75% lower than the average conventional gasoline-powered vehicle, and 55% lower than the average conventional hybrid vehicle.

Peak Oil / Energy Sustainability

Conventional gasoline engines use refined oil (gasoline) as their energy source. While there has been much discussion and alternative views regarding the amount of oil resources still available globally ("Peak Oil"), the long-range outlook for oil indicates that supplies are under intense pressure due to growing global demand, existing oil fields are declining in productivity, and there is a growing gap between newly discovered resources and rising demand driven by industrializing countries such as China and India.

These trends are likely to cause the price of gasoline to continue to rise over the long term. Within California, consumers, businesses, and government agencies are spending nearly \$60 billion annually on gasoline, much of which is imported.

PEV Chargers and a PEV Ecosystem

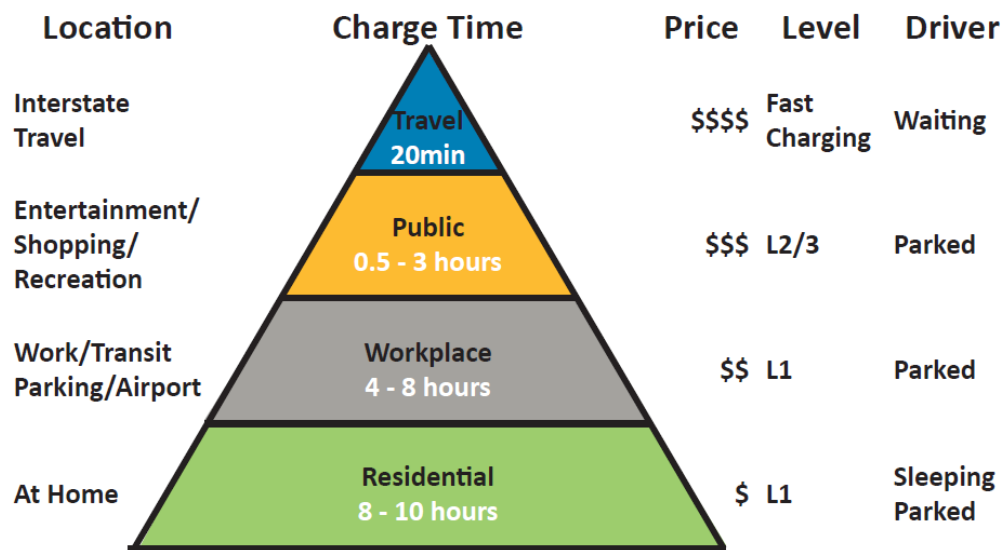
Currently, PEV Chargers consist of three types of chargers: Level 1 AC Charging, Level 2 AC Charging, and Level 3 DC Fast Charging. Level 1 Charging is the most basic and common form, using 120 volts of electricity from the electrical grid to charge vehicle batteries, and can charge a PEV in 5 to 20 hours. The 120 volt charging can be provided through a common wall receptacle. PEV's typically come with at 120- volt charging device.

Level 2 charging provides 240 volts of electricity and can recharge vehicles at a faster rate than Level 1 chargers, typically 4 to 7 hours. Level 2 chargers typically require a dedicated circuit and charging station to be installed. Currently Level 2 chargers comprise the majority of publically available charging stations in California.

Level 3 DC Fast Charging transfers higher voltage (typically 400-500 volts) direct current to vehicle batteries, charging PEV's at a much faster rate, as short as 15 minutes. Currently only a few fast chargers are installed in California, and they are typically located in publically available locations near major transportation corridors.

Drivers of PEV's have different driving patters compared to gasoline powered vehicles, and typically recharge the vehicles' batteries when the vehicle is parked, either at home, at the workplace, or at public places such as local parking lots and parking garages. The table below shows the way charging locations are prioritized for charging within a regional network. In order to reduce "range anxiety", the following charging systems should be provided regionally and within a larger interstate system to match the driving and parking habits of drivers.

Figure 4.2: Pyramid of PEV charging priorities



Source: Southern California PEV Readiness Plan

State Requirements for PEV's

There currently are a number of state laws in California that support PEV's through regulations, incentives, and programs. These include the following:

Executive Order B-16-2012 (2012) - Directs California to “encourage the development and success of zero-emission vehicles to protect the environment, stimulate economic growth and improve the quality of life in the State.” The Order sets an objective of 1.5 million PEV’s on the roadways of California by 2025.

AB 118 (2007) - Provides \$1.4 billion in funding for clean vehicles and their associated infrastructure, collected through Vehicle License and Smog Abatement Fees. Annual funding from AB 118 enables the state’s vehicle rebates for PEVs and grants for PEV-technology companies. It is scheduled to sunset in 2015 unless reauthorized.

Low Carbon Fuel Standard - A set of regulations established pursuant to AB 32 and Executive Order S-01-07 (2007) requires fuel providers in California to ensure that the mix of fuel they sell into the California market sees a 10% reduction in carbon content by 2020. Growing the PEV market can be a key way to achieve the low carbon fuel standard regulations

Carpool Access - Two bills enable use of carpool lanes by ZEVs: Senate Bill 535 (Yee, 2010) and Assembly Bill 2405 (Blumenfield, 2012). Certain PEVs, including pure BEVs and hydrogen FCEVs, are eligible for white colored carpool stickers. The cleanest PHEVs are currently eligible for green colored carpool stickers, of which there is a total limit of 40,000. Both programs are scheduled to sunset in 2015.

AB 2502 (2012): Permits car dealers to include the cost of electric vehicle charging stations within electric vehicle purchase financing, making it easier for PEV purchasers to get in-home charger installations.

CALGreen Code (Part 11, Title 24): California’s green building code promotes environmentally sustainable building practices, and includes both mandatory requirements and voluntary measures. Currently, all PEV-related measures in the CALGreen Code are *voluntary*, and entail the installation of PEV Charging infrastructure (“pre-wiring”) in buildings with dedicated parking spaces. The Cal Green ZEV measures are summarized in Attachment 3 to this transmittal.

PEV Requirements in other Jurisdictions in California

Currently, only a handful of jurisdictions within California have building codes that require the installation of either pre-wiring or PEV chargers in new construction. This includes the cities of Los Angeles and Sunnyvale. None of the other cities within Santa Clara County, except Sunnyvale, have codes requiring the installation of PEV wiring or chargers. This research is summarized in Attachment 2 to this transmittal.

Under Los Angeles’s Green Building Ordinance, all new single family and low rise multifamily residential buildings are required to install panel capacity and conduits for Level 2 PEV Chargers. Los Angeles has voluntary measures for High Rise residential and non-residential buildings for installing Level 2 PEV chargers at the time of new construction with 5% of the parking spaces dedicated for PEV’s.

Under Sunnyvale’s Ordinance, all new residential buildings and industrial, research and development, office buildings with more than 100 parking spaces are required to install pre-

wiring for Level 2 chargers. The non-residential buildings are required to dedicate 3% of their parking spaces to PEV's.

CONSEQUENCES OF NEGATIVE ACTION

Staff will make modifications as directed by the HLUET Committee and return a revised report for consideration.

STEPS FOLLOWING APPROVAL

The Department will conduct public outreach and return an Ordinance to the HLUET Committee for recommendation before forwarding onto the Board of Supervisors for final approval.

ATTACHMENTS:

- Attachment 1 - May 21 Board Referral on PEV Chargers (PDF)
- Attachment 2 - PEV charging requirements in other jurisdictions (PDF)
- Attachment 3 - CalGreen Exerpts regarding PEV Chargers (PDF)
- Attachment 4 - Comparison of CalGreen and LA County PEV Charging Requirements (PDF)