DOCKETED	
Docket Number:	19-IEPR-04
Project Title:	Transportation
TN #:	229242
Document Title:	Jessalyn Ishigo Comments Honda Follow-Up Comments - V2G
Description:	N/A
Filer:	System
Organization:	Jessalyn Ishigo
Submitter Role:	Public
Submission Date:	8/6/2019 7:04:03 PM
Docketed Date:	8/7/2019

Comment Received From: Jessalyn Ishigo
Submitted On: 8/6/2019
Docket Number: 19-IEPR-04

Honda Follow-Up Comments - V2G

Additional submitted attachment is included below.

Honda V2G Comments to CEC

Getting 5 million electric vehicles (EVs) on the road in California by 2030 requires increased EV sales and expansion of EV charging infrastructure. There are economic and policy challenges that impede progress due to high costs. Additionally, this massive shift in the transportation sector will also transform the power sector, thus making vehicle-grid integration (VGI) critical to maintaining power supply and safety. VGI includes both V1G, or controlled charging, and V2G, or bidirectional charging. California will need many tools in its decarbonization toolbox, and VGI is a crucial one that supports growth in EVs and ensures a constant, safe supply of electricity, while also enabling the successful integration of renewable energy resources to the grid. To unlock the benefits of VGI, and particularly V2G, policies must be changed and developed to allow interconnection of inverters that discharge to the grid, establish markets for VGI services, and streamline and incentivize customer participation.

Honda is deeply involved in ensuring electric vehicles can integrate safely with the electric grid while creating opportunities for economic value to the customer. For years, Honda has studied and tested VGI use cases. Assigning value to VGI services is key to market development, and in 2013, Honda joined the first project to demonstrate VGI revenue-generation through participation in the PJM Interconnection Regulation Market[1]. Furthermore, customer participation in VGI services is essential. Though enrollment in time of use rates can shift the load, they may not fully match grid needs. To create solutions, Honda implemented controlled charging – in 2018 Honda rolled out the nation's first smart charging program, Honda Smart Charge[2]. Additionally, through pilots and demonstrations[3], Honda found that bidirectional charging (V2G) can provide an array of grid benefits.

VGI Program Lessons Learned from Honda Smart Charge

There is little dispute over the potential benefits VGI can bring to the grid. Right now, the main challenge is assigning specific value to those benefits, and enabling the exchange of that value from benefitee to benefitor in a sustainable market. Honda studied the intricacies of this value exchange in the Honda Smart Charge program. Through telematics, the Honda Smart Charge program utilized controlled charging, or V1G, to schedule EV charging during times of low electricity demand instead of the early evening window of high electricity demand[4]. The key lessons from this program were behavioral in nature, as opposed to technical. The technical ability to dynamically schedule EV charging and perform demand response are proven.

For example, participants were recruited from a pool of Honda employees, and after a simple email recruitment, 13% of the initial pool volunteered to participate. But, after increasing the program advertising and adding a $50 enrollment incentive, 62% of the pool volunteered to participate. Additionally, research was performed to determine whether the participants' EV lease was active or set to end, which helped with targeted advertising. This showed that targeted customer research was key to increasing enrollment. Furthermore, a participant survey revealed that 80% of respondents were motivated by monetary incentives offered during enrollment and periodically throughout the program.

---

[1] See http://www1.udel.edu/udaily/2014/dec/honda-delaware-v2g-120513.html

[2] See https://cleantechnica.com/2018/08/02/emotorwerks-honda-southern-california-edison-offer-nations-first-smart-charging-program/

[3] See https://chargedevs.com/newswire/evgo-partners-with-uc-san-diego-on-vehicle-to-grid-projects/

[4] See https://csr.honda.com/2018/07/31/honda-smartcharge-beta-program-helps-electric-vehicle-drivers/

20% of respondents were motivated by the environmental benefits. It became clear that participation in the VGI program was driven by compensation to the driver.

Another key finding from the Honda Smart Charge program illuminated the challenges of the enrollment process. Simply put, customers need a straightforward enrollment process. During the sign up process for Honda Smart Charge, participants had to take several steps to become fully enrolled, and with each enrollment step, the number of participants dropped. A successful program requires ease of enrollment, and that is not currently possible under the current policy framework where both the CAISO and the utility require submission of separate forms. There must be a single checkpoint for customers to sign up, or else program participation will rapidly decrease. Additionally, if a customer was enrolled in a demand response program, for example with a smart thermostat, then they could be prevented from participating in Honda Smart Charge. Future policy should not limit VGI participation due to participation in another program that is utilized for a different resource.

Overall, the key lessons learned from the Honda Smart Charge program match up with the barriers to VGI Honda has identified before: market creation, simplified enrollment process, and capability to participate in multiple demand response programs. First, in order to participate, customers needed to see value in exchange for the grid services their EV would provide. Second, a complicated experience meant less program participation. And third, there was no technical or grid-based reason to prevent participation in multiple program. Each of these challenges can be mitigated by changes in policy.

V2X at Honda Smart Home US

Honda Smart Home US (HSHus) utilizes an energy management system that can direct power to and from a stationary battery, the vehicle battery, or both. The vehicle is connected through a DC CHAdeMO connector, using an offboard inverter. There are system losses in the inverter and battery, so HSHus will typically only discharge the vehicle when there is a DR request from our third-party aggregator. In that case, instead of curtailing home loads, vehicle battery is discharged to balance the home's consumption to the point of zero net power flow during the event (i.e. self-consumption only). Because it is possible that the vehicle could have been charged with non-renewable power, the HEMS machine does not discharge the vehicle battery at power levels above what is required for self-consumption while it is grid-tied. In case of a power outage, the system is able to island and power the home using the solar panels and the vehicle battery (or stationary battery) as a microgrid.

Through Honda's experience with the Honda Smart Home, the biggest observed barrier to providing better value to the customer and to the utility is the limitation of net energy metering (NEM). Ideally, any battery system would be able to push power out up to its rated output, regardless of whether the system was charged renewably or not. Without NEM tariffs for residential customers, the actual value of their V2G systems will be limited to whatever power their home is consuming at that moment, because they cannot economically provide power up to their full potential.

Thinking Ahead: Enabling V2G

In the long run, there is greater potential value from V2G than V1G, because in addition to participating in demand response, V2G allows the EV to discharge power from the EV battery to the grid, which can provide ancillary and regulation grid services. The ability to provide these grid services simultaneously enables the integration of more renewable energy resources onto the grid.

Similar to V1G, the challenges to commercializing V2G are primarily policy, not technical. While individual companies may disagree on technical pathways to achieving V2G, the real obstacle is the inability to perform V2G at all. Right now, due to the lack of coherent policy, companies developing V2G products must proceed slowly and without clarity. While this is a tremendous problem for companies, it also obstructs the massive grid transformation that the state requires in order to meet its transportation electrification goals. In order to meet its goal of 5 million ZEVs by 2030, automakers need to collectively sell millions more vehicles than they currently do. V2G is a critical component of the business case for electric vehicles. In order to realize the potential benefits that V2G can provide to the grid, customers, and other stakeholders, EV drivers must enroll in V2G programs. As Honda has seen in its Honda Smart Charge program, EV drivers need appropriate monetary incentives to enroll in a program and provide V2G services.

To maintain participation in a V2G program, EV drivers must be compensated for the grid services their EVs provide. This additional revenue stream will help boost sales and improve the economic argument for customers considering an electrified vehicle. In addition, the revenue from V2G would boost workplace charging by providing site hosts with the ability to earn a return on investment. Right now, workplace charging is a form of subsidized corporate and government charity for EV drivers. This system of charity prevents EV infrastructure from scaling, and ultimately prevents development of a viable business case for installing EV charging infrastructure. V2G is an essential component of the business cases for purchasing an EV, and installing EV charging infrastructure.

There is one activity related to enabling V2G that does not fall clearly into the bucket of state policy, but that the Energy Commission should be aware of – the National Electric Code (NEC). The NEC update currently underway is a barrier that specifically undermines V2G functions by extending NEC's authority over vehicle functions when power export is involved. Adoption of this portion of the NEC update would effectively preclude V2G functions.

V2G Policy Recommendations

The first step to enable V2G is not technical demonstrations or pilots without a pathway to commercialization – it is changing policy. First, interconnection rules must allow for interconnection of offboard and onboard inverters that discharge power to the grid. Second, markets must exist for V2G services. The regulatory agencies must make initial determinations on value and then proceed with a practical application. Through a market, values must be assigned to the energy flows and power sent in both directions, and then those values must be split among the site host, utility, aggregator, automaker, customer, etc. Third, customer enrollment is essential and as Honda Smart Charge demonstrated, driven by monetary incentives. However, it is not only EV drivers that must be incentivized, but the entire ecosystem – electrical contractors, local permitting offices, and site hosts will need incentives. Additionally, enrollment should not be barred due to prior participation in a separate demand response program. Finally, as learned from the Honda Smart Home US, net energy metering tariffs need to be adjusted in order to fully realize the value of V2G.

Conclusion

VGI, and particularly V2G, are critical to improving the economics of EVs and EV charging infrastructure. V2G is essential for achieving a point at which a site host could earn a return on investment for installing EV charging infrastructure. While many barriers exist to actualizing VGI, they are primarily policy-based.

From a technical standpoint, nothing should prevent VGI from playing a significant role in the transformation of the transportation sector. Developing policy that encourages deployment of VGI-capable infrastructure will be instrumental to successful transportation electrification in California and beyond. Without V2G and VGI-capable infrastructure, California will fall short of meeting its 2030 electrification goals.