December 18, 2017 IN-PERSON MEETING NOTES

Summary

- Attendance: approximately 30 in-person and 26 via Webex
- Presentations and notes available online: http://www.cpuc.ca.gov/vgi/
- CPUC Commissioner Peterman welcomed everyone and thanked all participants for their hard work throughout the working group process
- Dean Taylor, SCE, shared the most recent draft of the VGI glossary
- Tyson Eckerle, GO-Biz, shared a visual overview of the working group process
- Carrie Sisto, CPUC presented the CPUC, ARB, GO-Biz, and CAISO Hardware Proposal
  - Requested parties' feedback on further detailed requirements and proof of documentation
  - Shared the draft outline for the working group final report for participant feedback
- Rey Gonzalez, CEC, presented CEC's Next Steps for VGI
  - CEC recommends that all VGI charging systems have 3 capabilities
    - Speed: to respond within requirements for grid services (e.g. 4 sec for regulation)
    - Metering: for visibility, control and to capture value accurately
    - Simplicity: all EVSE must have the ability to seamlessly send and receive EV driver-specific charging preferences and payments across all geographic regions regardless of utility or service provider
  - Systems should be able to inform performance, to assist with future programs
- Stephanie Palmer, ARB, presented on ARB's next steps for VGI including implementing the Electric Vehicle Charging Station Open Access Act (SB 454) and leading an informal working group to continue some of the VGI value discussions we started during this working group
  - Implementing SB 454 will improve the customer experience: memberships are not required to access public chargers. Fees must be disclosed at the point of sale, access via payment technologies, register with AFDC, and use interoperable billing standards.
  - ARB will start SB 454 rulemaking next year, with draft deadlines
    - Workshop: March/April 2018.
    - Staff report August 7, 2018.
    - Hearing: September 2018
- CPUC and IOUs discussed the applicability of the Hardware Recommendation to existing SB 350 Applications
  - Stakeholders generally agree that the existing hardware recommendation should only apply to Level 2, conductive, alternating current, multi-user EVSEs deployed through ratepayer-funded investor-owned utility infrastructure projects.
  - Therefore, this proposal would not apply to the current SDG&E and PG&E light-duty SB 350 proposals before the Commission.
  - The proposal should apply to future IOU proposals that are in scope of the recommendation, but the proposal should be re-evaluated as the CPUC receives new proposals.
- Kevin Schnepp, DMS, presented on their EVSE Metering rulemaking
  - DMS anticipated releasing a proposed regulation in January 2018.
  - States adopt (or modify/amend as needed) the NIST model law handbooks
    - Handbook 44 – type evaluation for EVSE
    - Most recent version will be used for enforcement.

- o Scope of DMS rulemaking is commercial EVSE, where electricity is sold
  - o Regarding IOU investments, Handbook 44 would not apply to cases where the IOU owns the EVSE, but would apply in commercial settings where the IOU owns the make-ready and a third party owns the EVSE.
- Noel Crisostomo, CEC, presented on Cybersecurity concerns
  - o To avoid duplicating efforts, state Agencies will examine previous and ongoing work on cybersecurity and understand if there is any need for any CA state agency work on this topic, or if it is better for stakeholders to plug into the larger, ongoing cybersecurity discussions.
  - o Resources and expertise available from NESCOR, Idaho NL/DOE GMLC, DOE Vehicle Technologies Office, DOT Volpe (through Kevin Harnett), Livermore NL/CES-21, UL, NIST, IEEE, DOE Industrial Assessment Centers.
  - o Stakeholders also agreed that cybersecurity threats are constantly evolving.

Action Items & Next Steps
- Finish Glossary by mid-January
  - o Email any edits to the Glossary to Dean Taylor (dean.taylor@sce.com) and Hannah Goldsmith (Hannah@caletc.com) by Friday, January 5.
- CPUC will maintain the VGI website with all working group documentation. Final versions of documents in the Google Drive will be migrated to the CPUC website.
  - o If there are any documents you added to the Google Drive that should not be made public, email Mike Bourton (mbourton@kitu.io) by Friday, January 12.
- VGI Communications Protocol Working Group Final Report
  - o CPUC staff will develop the final working group report and recommendation.
  - o Please send any comments on the draft report outline to Amy Mesrobian (amy.mesrobian@cpuc.ca.gov) and Carrie Sisto (Carolyn.sisto@cpuc.ca.gov) by Friday, January 5.
  - o The CPUC Administrative Law Judges for the CPUC's SB 350 Transportation Electrification proceeding will incorporate the report into the record of the proceeding, and allow VGI Working Group participants the opportunity to comment on the final report and any questions in the ruling.
- Beyond SB 454 Rulemaking, ARB is open to holding voluntary meetings regarding value.
  - o Send interest to Stephanie Palmer by 1/5
  - o Value discussions will be coordinated with the CEC-led VGI Roadmap Update
- CEC Fuels and Transportation Division & Research and Development Division will be leading update of the 2018 VGI Roadmap, in coordination with the other agencies
  - o Please subscribe to TRANSPORTATION and ALTFUELS service lists for updates regarding the VGI Roadmap and funding opportunities in research and demonstrations.
- Coordinate cybersecurity efforts
- CAISO Energy Storage and Distributed Energy Resources Initiative Phase 3 (ESDER 3) will expand opportunities beyond ProxyDR for load consumption, will track performance measurement below the facility level. EV resources form as part of a DER Provider's (DERP) Aggregation

Resources

- Email the state agencies (CPUC, CEC, ARB, CAISO, GO-Biz) with any questions or comments: vgiworkinggroup@cpuc.ca.gov
- All working group materials documented on www.cpuc.ca.gov/vgi.

Detailed Comments

Hardware Proposal

- Jeremy Whaling, Honda
    - o Suggest the option for wifi OR Ethernet. Don't need both.
- Dean Taylor, SCE
    - o Clarify which segments apply: e.g. "Mixed use," public, work, fleet.
- Mike Bourton, Kitu
    - o Risk of specificity in hardware (e.g. Zigbee for utility smart meters)
    - o Don't specify technology to allow for flexibility to the entity responsible for EVSE network management. Consider risk of EVSP changing, so use an open international standard to avoid asset stranding to ensure the device works regardless of owner.
        - ▪ Consider Cell technologies that don't have a monthly service charge in addition to wifi, Ethernet, or new IoT technologies
        - ▪ Inexpensive converters or gateways that connect a LAN communication (Wi-Fi, ethernet) to WAN communication (cell).
            - • WAN technologies are coming, but there are no open standards yet
            - • Low bandwidth, low cost – long range IoT device to avoid cell stations.
            - • Generation 5
            - • Use Ethernet and Wi-Fi in conjunction (common: Ethernet to Wi-Fi).
            - • Need higher bandwidth for VGI.
                - o Harry Hass, Siemens: ZigFox and LORA technologies would be inadequate for VGI.
            - • Concern about reliability of communicating with an EVSE via the Residential HAN
- Oleg Logvinov, IoTecha
    - o Be careful/high risk in prescription of hardware for communications EVSE to PFE/utility. Upon mass market production, communication interfaces may change, as well as interface integration.
    - o Suggestions:
        - ▪ Cannot source the Si for 802.11n. Change language from 802.11n *compliance* → *interoperability* to address this.
        - ▪ Recommends use of "Wireless LAN and WAN IP-capable technologies.
- Steve Davis, Oxygen Initiative
    - o Modify the PFE/Utility communications pathway upon examination of each use case and optimize design for lowest cost at the specific location, e.g.: Wi-Fi to Cell base that serves 10 EVSE.
    - o Risk with prescriptiveness. Be flexible to optimize northbound communications.
- Jeremy Whaling, Honda

- o Consider, what is "future-proof" changes in a few years. Will this be updated? Will recommendations be flexible?
- Joshua McDonald, SCE
  - o SCE requires cellular and LAN, but does not prescribe design of LAN.
- Lance Atkins, Nissan
  - o The titles of the tables in the Hardware Proposal should be clearer so they are not taken out of context. The recommendation is a minimum requirement, and site hosts can choose what best meets their needs.
- Dean Taylor, SCE
  - o Clearly exclude: DC, wireless, V2G. Since DC charging is not necessarily just fast charging, clarify that all DC is excluded from the recommendation.

CEC Presentation, Rey Gonzalez

- Peter Klauer, CAISO: What research opportunities are available for CAISO to support?
  - o RG: CEC EPIC 3 Investment Plan has been approved with a PD, looking for best opportunities to enable adoption. Looking for best interoperability to enhance the grid
  - o RG: LAAFB is a proof of concept. It worked, but how moving forward with standards is a critical need to get this mainstream. It is critical that early deployments maximize standards-based efforts to continue progress.
  - o PK: There are opportunities for a 4 second response. Controller system broken into individual vehicles. There is added complexity around getting the data to the ISO.
    - ▪ RG: Putting EVSE with standards in motion will drive other opportunities for demonstrations or test beds and successful deployments.
- Jeremy Whaling, Honda
  - o Frequency regulation is just one market, but it is additive to other markets. Don't need a 4 second response time for most use cases. Need to look at VGI value of providing frequency regulation, because this is costly. Suggest keeping metering at the HB 44 level.Cost for metering is not a problem, but concern about cost of infrastructure for network.
- Abigail Tinker, PG&E
  - o Is this CEC's vision for every EVSE?
    - ▪ There may be dependencies based on the geographies and installation requirement, but the benefit of standardized communications is to enable functionality and use. Critical components in moving forward.
- Mike Bourton, Kitu
  - o Rule 21 autonomous controls (frequency/Watt curves) require no communication. Instead, a behavior is downloaded on the inverter.
    - ▪ Peter Klauer, CAISO: Given loss off rotating mass generation without governor controls, fast response is needed. Inverter-based resources can provide the effect of governor-control.
- Adam Langton, BMW
  - o Important to value the utility services provided by flexible vehicle charging.
- Oleg Logvinov, IoTecha

- o Receptive of the next steps because they push the state of the art. EVSE can do these functions now and will be needed for transactive energy, swarms, and other use cases.

Application of Hardware Recommendation to Existing and Future Utility Proposals

- David Goldgraben, SDG&E: Proposal is for 90k Level 2 Residential Wi-Fi-enabled EVSE.
  - o Can do flash software updates.
  - o Protocols used in Power Your Drive are OCPP and OpenADR. Presumably would use the same for their residential proposal.
- Abigail Tinker, PG&E: DCFC does not apply. The nature of the use case does not allow flexibility.
  - o For DCFC, it is not a problem to incorporate the EVSE communications, because it is cheaper.
  - o Program implementation considerations must be clarified
- Steve Davis, Oxygen Initiative
  - o DCFC loads are not curtailed. Therefore, CHAdeMO and CCS have the communications necessary for any limited VGI that we would do at DCFC.
  - o For LDV proposals: Must ask what the purpose of the effort was. The state will pay a price for not applying these recommendations, by creating non-interoperable systems.
  - o SDG&E should apply the proposal to residential because it accounts for 80% of charging.
  - o Justin Regnier: How many years should these apply?
    - SD: Reevaluating is an ongoing thing. The reason to act as fast as possible is to not fight the last war. Must prepare for autonomous EVs that will populate residential as well as multi-user chargers. Need to prepare for seamless roaming/plug-and-play. Needed all of the VGI options available to us- yesterday.
- Dean Taylor, SCE
  - o Agree with applications of the hardware proposal.
  - o Would the recommendation change to accommodate wireless at home, DC home, V2G?
    - Noel Crisostomo, CEC: EVSE functionality needs identified in EPIC 3 are immediate. EVI-Pro model identifies the value of sharing at $1-2B by 2025. Wireless and V2G chargers are needed.
    - Peter Klauer, CAISO: Solar will need to be absorbed.
    - Mehdi Ganji: Long term dwell chargers at public transit could be used for VGI
- Tom Ashley, Greenlots
  - o Nothing is happening "too quickly" because this type of regulatory process is not fast. It will require continued evolution and ongoing re-evaluation.
  - o Larger stakeholders are looking for guidance and a level of certainty in large scale program investments.
  - o Suggest that part of the Commission's standard of review for future IOU proposals is an IOU explanation of communications architecture.
  - o Market certainty comes with comfort: EVSPs are considering changes in technology behavior, and this effort should likewise take that into account.
- Jeremy Whaling, Honda
  - o Public charging is needed here, today.

Metering

Kevin Schnepp, DMS

- o AB 808: commercial sales of alternative fuels are subject to DMS authority
- o Handbook 130. Sales must be in kWh.
  - Section 12107 –pertains to electric Wh meters, hydrogen dispensers, etc.
- o DMS Enforcement via 55 Offices of Weights & Measures, across all 58 counties.
  - State: establishes Type Evaluation procedure
  - Counties: responsible for field inspections. (They currently inspect electricity submeters used to bill tenants.)
  - State and County provide technical support
  - California Type Evaluation Program (CTEP)
    - NIST Handbook 44 Section 3.40 requirements.
- o Commercial accuracy requirements regard energy delivered out of the EVSE system.
  - 1% acceptance upon installation
  - 2% during operational phase
  - Communications are not part of type evaluation.
- o Next Steps: Goal is successful commercialization of EVSE
  - DMS: Will remove tentative scope and publish in Notice Registry.
  - State: Formalizing test procedure
  - State: Provide examination procedures outline
  - County: Registering commercial EVSE
  - County: Examining and sealing
- CAISO, Peter Klauer
  - o Simplify the metering requirements for DERP representations of aggregated resources. DERP sub-resources are part of a "Scheduling Coordinator Metered Entity", where the DERP collects revenue quality meter data.
    - Handbook 44 excludes application to utility or wholesale electricity settlement.
    - ISO has introduced options to reduce barriers and simplify metering requirements.
    - Distribution system will play a role because the jurisdiction for metering resides with a LRA. If LRAs won't define or can't, ISO has guidelines.
- Dean Taylor, SCE
  - o Is DMS enforcement sustainable at millions of chargers?
  - o Kevin Schnepp: County Offices of Weights and Measures are already looking at EVSE.
- Steve Davis, Oxygen Initiative
  - o Is DMS' EVSE requirement applicable in residential charging?
  - o KS: DMS applies to residential chargers, if the third party charges for it. Think about the end user: they need to know.
  - o SD: Need to have a meter association with the vehicle.
  - o KS: Metering technology is good enough and more than adequate, if the system can measure electricity. It is reasonable to use robust metering.
- Chris King, Siemens
  - o Siemens supports HB 44 application to any utility-funded or –supported EVSE. Ideally, all would have a submeter. Suggests a mandate that EVSE have submeters, beyond just those used for commercial electricity sales.
- Amy Mesrobian, CPUC

- o For stakeholder feedback: HB 44 is not applicable to IOU-owned EVSE. Should we extend the HB 44 requirement in these cases?
- Mike Bourton, Kitu
  - o The IOUs' tariffs for the CPUC Submetering Protocol Pilots required HB 44
- Hannah Goldsmith, CalETC
  - o Has previously submitted to comments to DMS.
    - KS: Have been incorporated and reviewed. Will have proposed regulatory language next month. Invokes another 45 day comment period.
    - KS: Could be implemented by Q3 2018.
    - Amy Mesrobian: Cost?
      - Manufacturer pays for the type evaluation.
      - If approved, the owner/operator of the EVSE device must pay a registration fee upon every commercial installation.
- Noel Crisostomo, CEC
  - o Does DMS' requirement apply to any commercial EVSE, regardless of power? (e.g. Level 1 with EV match)
    - KS: EV Match may change their business model, but DMS currently applies.

Cybersecurity

- Kevin Harnett, U.S. Department of Transportation, Volpe National Transportation Systems Center
  - o DOE Vehicles Technology Office, DOT Volpe, and Department of Homeland Security's Technical Meeting on Electric Vehicle and Charging Station Cybersecurity, November 29-30.
  - o Developing a report for VTO re: EVSE need to leverage industrial controls
- Mike Bourton, Kitu
  - o UL 2900 – could be too costly
  - o Unsecure EVSEs could pose a public credibility problem, harming confidence & adoption
  - o Develop guidelines not requirements. Must understand the return on the effort
- Oleg Logvinov, IoTecha
  - o Consider prior work from Industrial Internet Consortium
    - Look beyond EV & EVSE, because of operations in multiple domains (energy & transportation)
    - Architectural framework must ask "who" (identity of) is exchanging data. Prevent manipulation.
    - IEEE 2413: Identity management and verification.
      - Pros and cons of translation.
      - If identity is verified, security is enhanced.
  - o Delineating by ownership is difficult: "We can't say that they're owned by one person." Must secure channels of communication and manage the truthfulness of the identities, including through physical protection.
- Tyson Eckerle, GOBiz: Where is state action most appropriate?
  - o Mike Bourton: Put the onus on industry (insurance requirements). What is the value for public confidence? There's no exact value (art vs. science)

- o Dean Taylor: What immediate steps can be taken?
- o Oleg Logvinov: Hold an open workshop on cybersecurity to cultivate ideas and allow businesses to provide information, ask what are the pain points for parties?
  - ▪ Justin Regnier: Limitations on the security of an open meeting?
    - • OL: We need to have an ecosystem and drive economies of scale, so must include stakeholders and competitors. Since interoperability is key information must be shared to ensure everyone's success, even though not everyone will share. A bad experience can delay the industry several years given public sensitivity. Eliminate concerns 1 by 1 by building parts of an interoperable ecosystem.
- o Steve Davis, Oxygen Initiative
  - ▪ Leverage and work with the VTO in order to embrace a global or national standard. The ISO 15118 conformance testing process, utility penetration testing, and others must continuously protect infrastructure in a "never ending battle."

Post Working Group Policies

- Demonstrations
  - o Dean Taylor, SCE:
    - ▪ Demonstration of Deliverable 2 & 3 to move beyond a paper study of value
    - ▪ ID and implement promising use cases.
    - ▪ Use the benefits framework: customer, ratepayers, distribution, ISO, DER
    - ▪ Concern about party bandwidth. Can consultants provide support?
    - ▪ Previously submitted comments on the VGI Roadmap.
  - o Jeremy Whaling, Honda
    - ▪ Use cases ready for implementation are: lack of randomization of TOUs both at workplaces and neighborhood transformers. Demand Charge Mitigation.
    - ▪ Provided written comments to the Working Group on suggestions.
  - o Abigail Tinker, PG&E
    - ▪ PG&E has an EPIC proposal to look at how to avoid simultaneous loads in neighborhoods, as Jeremy suggested.
    - ▪ Coordinate with DER efforts including Storage Multi-Use Applications, DRP.
  - o Adam Langton, BMW
    - ▪ Identify value of use cases.
    - ▪ Paper studies are all over the place, but people must buy into them.
  - o Steve Davis, Oxygen Initiative
    - ▪ To deploy infrastructure supporting 1M PEVs by 2020, need to get going.
    - ▪ Use imagination in solicitation design
    - ▪ Focus on consumers' seamless experiences
    - ▪ Do something big that accelerates all of this.
  - o David Goldgraben, SDG&E
    - ▪ Understand the net value. What are the costs of VGI to smooth out duck curve?
  - o Jamie Hall, GM
    - ▪ Need to develop value for OEMs

- o Mike Bourton, Kitu
  - Universal/open EVSE
- o Ted Bohn, Argonne National Lab.
  - Grid Modernization Lab Consortium project on V2X management is determining responsiveness to commands. Wants to leverage what is done in CA.
- o John Holmes, University of California San Diego
  - Campus has test setups to test dispatch algorithms for managing load and LMP.
  - Has stubs from NRG Settlement that could receive 400 chargers
- o Oleg Logvinov, IoTecha
  - Set up testbed for parking lot of chargers: PV, solar, storage, feed. Confined lab. Operational next year, replicable anywhere. 15118 box to OCPP. Suggestions of what to include in a demonstration. More microgrids that can self organize and manage.
- o Rey Gonzalez, CEC
  - Conduct research reviews informally and more frequently to enable learning?
  - R&D projects must demonstrate ratepayer benefits, prove readiness for pre-commercial technologies.
  - Scoping workshops will shape funding opportunities.
  - Must ensure that projects support deployment
  - State must get started with advanced technologies, sooner than later.
- o Bill Boyce, SMUD
  - Report on SMUD's value of grid integration submitted to IEEE. Bill will check if he can share any of the report with the Working Group.
  - Based on 8760 hr PLEXOS analysis savings: 15-20% of annual cost, beyond Demand Charge Management, which is site specific.
  - Need a global review based on commutes.
- o Lance Atkins, Nissan
  - Big data analytics are needed to determine vehicle availability and grid availability
  - Must determine what data is public vs private

Participants

- In-person: Oleg Logvinov, Mike Bourton, Dean Taylor, Josh McDonald, Jeremy Whaling, Steve Davis, David Goldgraben, Lance Atkins, Wufan Jia, Tom Ashley, Jamie Hall, Adam Langton, Richard Schorske, Liam Weaver, Jamie Hall, Quang Pham, Satoko Horie, Amy Yamamoto, Abigail Tinker
- Remote: Bill Boyce, Ted Bohn, Constance Douris, George Bellino, Hank McGlynn, Hannah Goldsmith, Harry Haas, Jenny?, Jim Tarchinski, Joel ?, John Holmes (UCSD), John Mengwasser, Jordan Smith, Keerthi Shankar, Kevin Harnett, Kiel Pratt, Maryanne Marchese, Medhi ?, Mike Ferry, Natalia, Raffi Rodrigo, Roberty Uyeki, Stephan Voit, Steven Yip, Rolf Bienert
- CA Agencies: Carrie Sisto, Amy Mesrobian, Peter Klauer, Stephanie Palmer, Justin Regnier, Noel Crisostomo, Rey Gonzalez, Matt Fung, Tyson Eckerle, Kevin Schnepp, Jen Kalafut, Melicia Charles